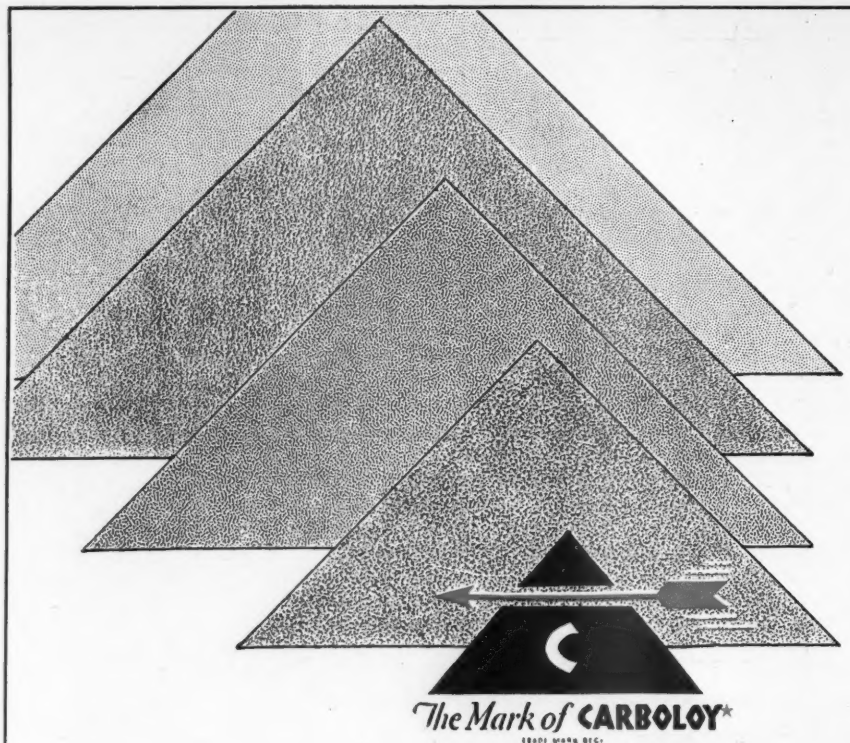
WIRE & WIRE PRODUCTS

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

V
VAUGHN
COPPER WIRE DRAWING
MACHINES
. . . are now producing large outputs per unit at high speeds with a maximum of safety and cleanliness and a minimum of floor space. Available in four sizes, designed to produce all sizes of copper wire, from No. 2 to No. 40 B. & S. gauge.
The No. 1, No. 2 and No. 3 machines are manufactured under a license from the Western Electric Company, Inc., by which certain exclusive rights have been acquired.
THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO.

November 1930



The Mark of CARBOLOY*
(TRADE MARK REG.)

CARBOLOY DIES

are now available to meet your exact requirements in drawing bar stock, wire and tubing.

Carboloy Die Service means Dies for your particular needs rather than standardized shapes for all materials.

The use of a Carboloy Die will give you more uniform results with less rejections.

*Look for the mark of Carboloy:—if the mark is not on the product it is not a Carboloy cemented tungsten carbide product.

CARBOLOY COMPANY, Inc.

Eastern Die Sales Office and Factory
144 Orange St. Newark, N. J.

Western Die Sales Office
1770 East 45th St. Cleveland, Ohio

Speed Production with

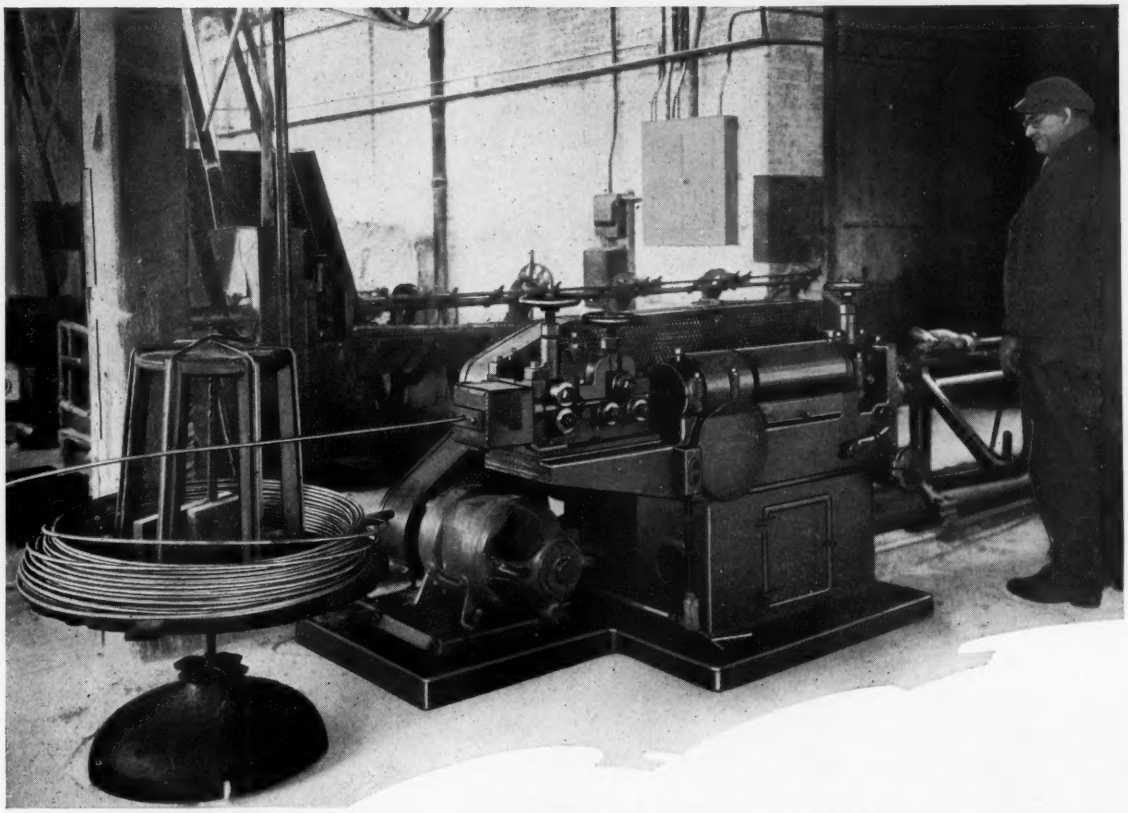
CARBOLOY

TRADE MARK REG.

WIRE & WIRE PRODUCTS, Vol. 5, No. 11, Nov., 1930. Executive office, 551 Fifth Avenue, New York, N. Y. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Secretary and Treasurer. Publication office, 49 E. Washington Ave., Washington, N. J. Subscription price: U. S. and Canada, $5.00 per year, 50 cents per copy; Foreign, 7.50 per year. Entered as second class mail at the Post Office at Washington, N. J., under the Acts of March, 1879, and copyright, 1929, by Quinn-Brown Publishing Corporation.

MODERNIZE

Your Wire Straightening and Cutting Department



12 Shuster Machines in this Plant, where they make only high grade wire, and this one is cutting $\frac{5}{16}$" wire to 15′ lengths

Production increased 50% is the report of the user in whose plant the photograph shown was taken.

You can save as much, by installing up-to-date machinery.

Our modern Machines are many steps ahead of the old ones.

FLIERS are of STEEL.

They are mounted in Timken Roller Bearings.

ALL MAIN BEARINGS are bronze bushed.

Texrope drive to Motor.

One Motor mounted on the machine.

Increased speed, therefore increased production.

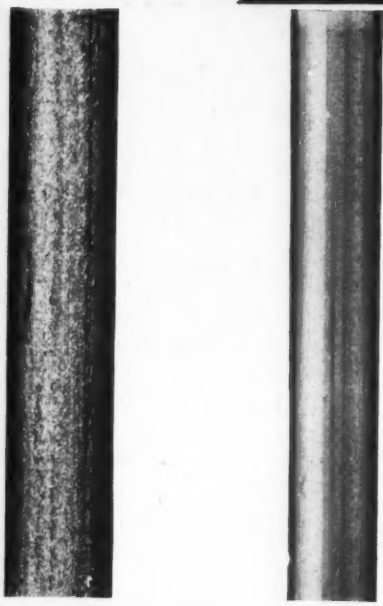
We'll be glad to tell you more about them

THE F. B. SHUSTER COMPANY

NEW HAVEN, CONN.

STRAIGHTENER SPECIALISTS SINCE 1866

BELLET



B MICRO PHOTO OF PURE NICKEL WIRE C

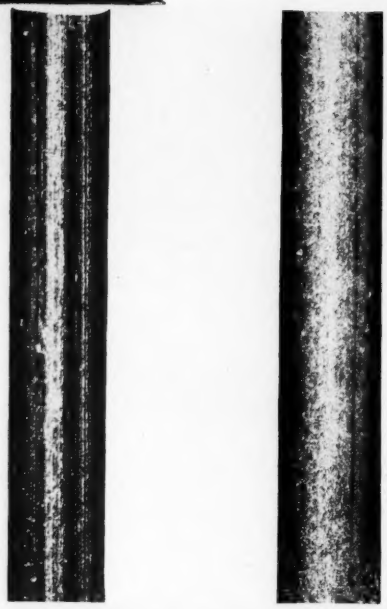
B. Pure Nickel Wire Drawn through Steel Die.

C. Same Wire Drawn through Bellet Composition Metal Die.

A Leading Steel Wire Manufacturer Writes

"We are pleased to report that our experiments with your composition dies have been very satisfactory. In fact we expect to use them throughout our plant in sizes ranging from .025 to .0101.

In spite of severe usage while being tested out, some of these dies have drawn more than a ton of wire, which we consider quite remarkable, and most of them have drawn but slightly less."



D MICRO PHOTO OF HIGH CARBON STEEL WIRE E

D. 80% High Carbon Steel Wire Drawn through Diamond Die.

E. Same Wire Drawn through Bellet Composition Metal Die.

Note the Difference In Texture and Finish---And On Production—

On Pure Nickel Bellet Composition Dies have produced 1500 lbs. and are still in use as against 300 lbs. of steel dies.

Bellet Composition Dies Size .064 have produced 10,000 lbs. of copper wire and are still in use as against 1,000 lbs. per steel die.

THESE DIES WILL GIVE

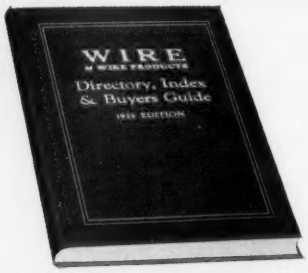
INCREASED PRODUCTION, BETTER FINISHED WIRE WITH NO TROUBLE FROM SIZE-DIFFERENCES, HARDNESS, ETC.

FOR INFORMATION WRITE

BELLET DIAMOND DIE WORKS

315 5th Ave., New York, N. Y.

Factories: Trevoux, France, New York, N. Y.



Fill In Listings Below To Insure Accurate Information On Your Products In The

1931 Buyers Guide and Year Book

Of The Wire Association

THE fourth annual edition of this Buyers Guide is now being compiled. It is the only reference work of its kind for bare and covered wire makers, fabricators of wire products, and sources of supply for wire, wire forming and wire mill equipment.

Over eight hundred classifications, alphabetically arranged, cover everything used in the making and forming of all kinds of wire. The listings range from Abrasives to Zinc Wire.

WHO MAKES IT?

The fourth annual edition, greatly enlarged and improved, and combined with the Year Book of the Wire Association is the only complete and up-to-date Buyers Guide for:

Bare and Covered Wire in All Metals
Machinery, Supplies and Equipment for Wire Drawing and Forming
Lists of Industrial Users of Wire

The book is a handy size for reference, 6¼x9¼ inches, printed in clear type on heavy paper, bound in stiff boards and covered with dark cloth that will withstand the wear and tear of shop use without getting soiled. Use the coupon below to send in your information.

¶ Below is a typical listing from the 1930 Buyers Guide

MACHINERY—Spring. Also See Machinery: Bed Spring

Baird Machine Co., Bridgeport, Conn.
Bernitz, J. I., 25 Beaver St., N. Y. C.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Burnett Mfg. Co., Los Angeles, Cal.
Coulter & McKenzie Spring Corp., Bridgeport, Conn.
Evans' Sons, John, 506 N. 13 St., Phila., Pa.
General Eng. & Supply Co., 160 5 Ave., N. Y. C.
Irmisher, M. A., 30 Church St., N. Y. C.
Pine-Uhrig Co., Oshkosh, Wis.
Rhinevault, Harry A., Chicago, Ill.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
SLEEPER & HARTLEY, INC., Worcester, Mass.
Southwark Fdry. & Mach. Co., 1150 S. 4 St., Phila., Pa.
Superior Spring Winding Tool Co., 776 3rd St., Milwaukee, Wis.
Wells, Frank L., Kenosha, Wis.

MACHINERY—Staple

Baird Machine Co., Bridgeport, Conn.
Bates Mfg. Co., Joliet, Ill.
Bernitz, J. I., 25 Beaver St., N. Y. C.
Humphrey & Sons, Joliet, Ill.
Irmisher, M. A., 30 Church St., N. Y. C.
Nilson, A. H., Machine Co., Bridgeport, Conn.
SLEEPER & HARTLEY, INC., Worcester, Mass.

MACHINERY—Stitching. Wire

Beck Machine Co., C., 605 Chestnut St., Phila., Pa.
Cobden Mach. Works, Cobden, Ill.
Fuller, E. C., Co., 28 Reade St., N. Y. C.

FOR FREE LISTING

There is no charge for having your name listed in the Buyers Guide and Year Book of the Wire Association. Simply fill out the following:

_____

_____

_____

_____

_____

_____

_____

Firm .....

Address .....

City and State .....

Plant Supt. or Manager .....

SIGN BELOW ONLY FOR BOLD FACE LISTINGS

add in the following space the name of the individual authorizing charge:

Name .....

BOLD FACE LISTINGS, $5 EACH

The maximum charge of $25 entitles you to as many bold face listings as you can use. (See Specimen listings above.)

Constitution and By-Laws of The Wire Association

Dated as of Sept. 30, 1930

CONSTITUTION

We, the undersigned subscribers, being severally identified with the wire manufacturing and/or allied industries, mutually agree to form an association for the object, and under the plan, set forth below. By causing our names to be subscribed thereto we agree to the provision of this

CONSTITUTION.

ARTICLE I

Name

The name of this Association shall be THE WIRE ASSOCIATION.

ARTICLE 2

Objects

The purpose of The Wire Association shall be:

To collect and exchange information relating to the production, distribution, consumption and use of wire and wire products;

To disseminate accurate information regarding wire products and how they best may be used;

To develop methods for the improvement of the welfare of those engaged in the wire industries, or in the use of its product; and for such other purposes as, from time to time, may be of benefit to the wire industries.

To improve production methods and to conduct research in all phases of wire drawing and wire working.

To develop and maintain friendly relations among the members and to afford them an opportunity for the interchange of ideas on production and management problems and to maintain a central clearing house for technical information.

To eliminate waste through simplifications and standardization of sizes, styles and varieties and to standardize trade terminology.

In general to promote the serviceability of the wire industries to the community at large.

ARTICLE 3

Limitations

No agreement, understanding, combination or arrangement or any form of concerted action to curtail production, fix prices, suppress competition, or in any other manner to restrain trade or commerce, or to monopolize, or attempt to monopolize any part of the trade or commerce of the country shall be permitted in The Wire Association, nor any other act or acts which may be in contravention of law or good business practice. Each member of the Association shall be wholly free to conduct his or its business without legal or moral accountability to the Association or to any member thereof.

ARTICLE 4

Inspection of Records

The books and records shall reflect the complete details of all the activities of The Wire Association, and shall be open to inspection at all times by the departments or bureaus of government interested. All reports of general interest distributed to the members shall be furnished to others desiring them for such consideration as may be regularly established by The Association.

ARTICLE 5

Non-Profit Organization

The affairs of The Wire Association shall not be conducted for profit.

ARTICLE 6

Membership

Any corporation, firm or individual actively engaged in the production, forming or fabricating of wire and wire products or the manufacture of wire mill machinery and equipment and any others rendering services to the wire industry shall be eligible for membership. Among individuals eligible for membership shall be wire mill executives, superintendents and foremen, plant engineers, traffic men, credit men, salesmen and all others engaged in the wire industry, manufacturers of wire machinery and equipment and persons interested commercially in the wire or wire products industry. Acceptance of election to membership shall imply subscription to the provisions of this constitution. The By-Laws may establish classes of members with varying respective rights, privileges and powers.

ARTICLE 7

Management

The management and control of The Wire Association shall be vested in a board of directors, and in an executive committee of the Board of Directors empowered to act, ad interim, in accordance with the provisions of the By-Laws.

ARTICLE 8

Officers

The officers of The Wire Association shall be a President, one or more Vice Presidents, a Secretary, a Treasurer and a Chairman of the Board of Directors, all elected by the Board of Directors. The same person may be both Secretary and Treasurer. The duties and powers of the officers shall be defined in the By-Laws.

ARTICLE 9

Expenses

The expenses of The Wire Association shall be borne by dues payable by the members in accordance with the provisions of the By-Laws.

ARTICLE 10

By-Laws and Amendments

The By-Laws of The Wire Association shall provide the rules and regulations governing the management and conduct of the organization not otherwise provided by the Constitution. This Constitution, and the By-Laws, may be amended at any meeting of the Board of Directors by a two-third vote in person or by written consent, provided two weeks' notice of the meeting shall have been given together with a copy of the proposed amendment. Until amended the By-Laws shall be the terms and tenor of the By-Laws attached hereto, bearing even date herewith.

IN WITNESS WHEREOF, we have caused our names to be subscribed hereto, by our respective proper officers thereunto duly authorized, as of the 30th day of September, 1930.

BY-LAWS

Dated as of September 30, 1930.

ARTICLE 1

Membership

Section 1. Application for membership shall be in writing on forms provided by the Secretary, duly executed by the applicant and shall state:

(a) The name of the individual, firm or corporation applying;

(b) The branch of the wire or associated industries in which the individual, firm or corporation is engaged;

(c) The name of the applicant's representative, if a firm or corporation.

Applicants for membership in The Wire Association shall become members of this Association upon having received the written approval of not less than two members of the membership committee and upon payment of their annual dues except in the case of honorary members who shall be elected by unanimous vote of the full board of directors. (The applicant shall signify acceptance of election by subscribing his or its name to the Constitution and By-Laws.)

Section 2. Any member may withdraw at any time from membership in The Wire Association by giving formal notice of such withdrawal to the Secretary, and fulfilling all obligations to the Association incurred by that member to the time of withdrawal.

Section 3, Memberships shall be divided into Active Members, consisting of:

(a) Active company members consisting of firms or corporations with full voting rights. Annual dues $100. per yr.

(b) Active individual members, consisting of production executives, mill superintendents metal-

lurgists and foremen of mills which either draw, form or fabricate wire, with restricted rights to vote and the right to serve on committees but not to hold office.

Annual dues $10. per yr.

(c) Associate members, consisting of all others actively engaged in the wire industry or in the employ of the manufacturers of wire mill machinery and equipment, or individuals rendering services of any nature to the wire industry for pay. Associate members shall have no vote and and may not hold office in the Association.

Annual dues $10. per yr.

(d) Honorary members shall be persons of acknowledged eminence in the wire industry, officers of the technical production services of the United States Army and Navy and other technical departments of the United States Government. They shall not be eligible to hold office or serve as Directors of the Association and shall have no vote.

Section 4. There shall be a membership committee of five members appointed by the President with the advice and consent of the Executive Committee. Vacancies on this committee shall be filled and new members added by the president with the advice and consent of the executive committee.

ARTICLE 2
Meetings of Members

Section 1. A regular meeting of the members shall be held annually on the second Wednesday in June of each year for the purpose of electing Directors and for such other business as shall be placed before the meeting. Special meetings may be called at any time by the President or the Chairman of the Board of Directors.

Notice of the time and place of all meetings shall be given to each member in writing or by telegraph at least ten days before the meeting.

Section 2. At all meetings of the Association, no Honorary or Associate member and no individual Active members shall be entitled to vote for the election of Directors or for or against an amendment to the Constitution or By-Laws, but only the accredited representative of active Company members shall be entitled to vote on these matters, but all active members shall be entitled to vote on any other matters.

ARTICLE 3
Board of Dirctors

Section 1. The Board of Directors of the Association shall consist of the officers of the Association, to wit, the President, the Vice Presidents, the Secretary and the Treasurer and no more than ten other Directors elected at the annual meeting. Representation may be by proxy.

Section 2. The Board of Directors shall have power to hold meetings at such times and places as it deems proper. It shall be empowered to elect new members; to appoint an executive committee, and other standing committees, with such duties, consistent with the Constitution and By-Laws, as it may prescribe; to elect officers; and to have such other functions and authority as may be necessary to carry out the purposes of this Association.

Section 3. Regular meetings of the Board of Directors shall be held quarterly on the second Wednesday of March, June, September and December of each year. Special meetings may be held upon the call of the Chairman at any time upon the expiration of two days' notice.

Section 4. Five (5) members of the Board of Directors shall constitute a quorum.

ARTICLE 4
Executive Committee

Section 1. The executive committee shall consist of five Directors elected by the Board of Directors. The executive committee may act on behalf of the association in any matter upon which the Board of Directors is qualified to act, when the board is not in session. The executive committee shall appoint such clerks or other assistants required, and may provide in general for the detailed administration of the association. The Board of Directors in electing members of the executive committee shall designate one such member to serve as Chairman of the executive committee. The Secretary shall be an *ex-officio* member of the executive committee.

Section 2. Directors who are not members of the executive committee shall have the privilege of attending in person, or by proxy, all meetings of the executive committee, and to join in discussions, but without vote.

Section 3. Meetings of the executive committee shall be at the call of the Chairman upon at least one day's previous notice.

ARTICLE 5
Officers

Section 1. The duties of the officers shall be those usually pertaining to their respective positions.

It shall be the special duty of the Chairman of the Board of Directors to enforce Article 3 of the Constitution.

Section 2. The Secretary shall represent the executive committee as an administrative official, and keep a complete and detailed record of all meetings of the Board of Directors and executive committee. Subject to the control of the executive committee he shall be the active administrative executive of the Association.

Section 3. The Treasurer may be required to give bond in such sum and with such sureties as the executive committee may require. He shall have custody of and shall receive and disburse all the funds of the Association.

Section 4. The officers shall be elected annually at the first regular meeting of the Board of Directors.

Section 5. Any vacancy caused by disability, resignation or otherwise, may be filled at any time by the executive committee.

Section 6. The officers shall be elected from among the mill production representatives only and must be either, executives, manufacturers, superintendents or foremen, with the exception of the secretary who need not be a member of the association.

Section 7. No persons shall serve as President for more than two consecutive years and no more than one person representing the same firm or corporation shall serve as an officer of the Association during any one year.

Section 8. No officer shall receive compensation except the Secretary.

ARTICLE 6
Office and Publications

Section 1. The permanent office of the Association shall be located at the New York City office of "Wire & Wire Products," now published by the Quinn-Brown Publishing Corporation.

Section 2. Wire & Wire Products is designated as the official organ of the Association.

Section 3. There shall be published annually in Wire & Wire Products Annual Directory Index & Buyers' Guide the list of members, personnel of committees and general information concerning the Association.

Section 4. Each member of the Association shall receive, as included in his or its dues, a subscription to Wire & Wire Products and the annual "Wire" Directory. To this end, out of each member's annual dues paid in, the sum of five dollars shall be set aside for the purchase of such subscription.

Section 5. The Secretary, with the consent of the executive committee only, shall be authorized to cause to be printed and circulated among the members and such other classes of persons, firms or corporations as the executive committee may direct, any articles, compilations of statistics and other written information or material which may be of interest or value to the wire industry.

ARTICLE 7
Finance

Section 1. The annual dues shall be as follows:

Active Members

(a) Companies, firms or corporations $100.00

(b) Individual active members, wire mill production executives, mill superintendents and foremen ..... $ 10.00

Associate Members

(c) Individuals ..... $ 10.00

Honorary Members (d) No annual dues.

Section 2. All dues shall be payable in advance and shall cover the period of one year from the last day of the month in which a member joins.

Section 3. Funds in excess of these provided by the annual dues which may be needed for research and other work, shall be secured by voluntary subscriptions to be solicited from the members, or from others specifically interested.

MICROMETER PRECISION MICRO-WELD TRADE MARK

Fits Right Into Your New Economy Plans

"Production costs must come down"—is the order of the day. New price levels are dictating—and plants of every nature are discovering production economies that were unheard of a year or two years ago (when their need was not so urgent)!

SO LISTEN TO THIS:

Regardless of Price, MICRO-WELD will do the work of much bigger machines (and do it as well)—and you can have four of them for the price of one of yesterday's big, cumbersome welders!
These MICRO-WELD machines are new—in design—in precision—in size—in capacity for work—and in price, due to a quantity production plan.

Steel and copper plants have found it practicable to buy this machine by the dozen in order to have that many helping cut costs day after day due to their capacity and ability.

Model E → $175.00

Model T

$275.00

The full capacity of Model T is 7 kw. It welds stock of all shapes from ¼ to ⅝ inch in size. Available in any voltage or cycle required and works equally well on steel, copper, aluminum or special alloys.

The full capacity of Model E is 2½ kw. Either model can be had on a portable stand as shown here. Simplicity of operation is a big feature. *Instantly changes from No. 20 to No. 4 wires (or in between) and welds them perfectly.*

WE ALSO MAKE SPOT WELDERS FOR ALL REQUIREMENTS. A NOTE ON YOUR LETTERHEAD WILL BRING THE COMPLETE MICRO-WELD STORY---FOR YOUR PROFIT!

The Micro Products Company

140 Industrial St. Peoria, Ill., U. S. A.

European Office: H. A. Schlatter & Co., Kusnacht-Zurich, Switzerland.

WIRE & WIRE PRODUCTS

A monthly publication devoted to the production of Wire & Wire Products in all metals from the bar to the finished wire product.

Vol. 5 November 1930 No. 11

Contents

Combat Wire of the Signal Corps, By Capts. A. M. Shearer and Geo. P. Bush 417
Lives—Regiments—Whole Armies—All Dependent Upon the Quality and Quantity of Communication Wires.

Heat Control in Cable Insulating ....By Alvin M. Stock 420
Insulation from Early Days to Date—How Lead Sheaths Are Put On—Extrusion Methods.

British Insulated, A Great Cable Company, Part II, By A. C. Blackall 422
A Description of the Plant, Methods, Equipment and Products of a Famous British Wire Company.

Structure and Conductivity of Hard-drawn Copper Wire By R. W. Drier and C. T. Eddy 424
Effect of Direction of Drawing, Crystal Orientations, Changes in Specific Resistivity.

Hard Metal Substitutes for Diamonds .....By A. Ackermann 430
Composition of Various German Extra-hard Metals—How to Prepare and Care for Dies—Lubrication—Precautions.

News of the Industry 426

Recent Trade Literature 431

Review of Recent Patents 432

Domestic Exports and Imports 433

New Wire Machinery and Equipment 434

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Official Publication of The Wire Association

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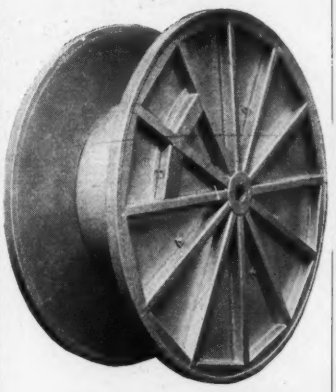

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R. B. HAYWARD COMPANY

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Manufacturers of

"RED HEAD" SHIPPING REELS MACHINE

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UN-WIDIA ALLOY DIES

A PROVEN PRODUCT

DIAMOND DIES
UWDC
UN-WIDIA DIES

Specialization makes for progress
We make dies exclusively

Un-Widia Alloy Dies are the result of the collaboration of the world's best known makers of special alloys, Fried Krupp Co., and America's largest wire and tube die manufacturers, the Union Wire Die Corporation, who have the exclusive right to sell Widia metal, for drawing purposes, in the United States, Canada, Mexico and France.

Un-Widia Dies
are now
made for shaped wire

THE KRUPP PRODUCT
Widia metal is made into dies
and sold exclusively in the
UNITED STATES, CANADA, MEXICO and FRANCE
BY

UNION WIRE DIE CORPORATION

NEW YORK

Paris Pittsburgh Hamilton

WIRE & WIRE PRODUCTS

A Monthly Publication Devoted to the Production of Wire and Wire Products in all Metals from the Bar to the Finished Wire Product.

Vol. 5 NOVEMBER, 1930 No. 11

Combat Wire of the Signal Corps

Lives—Regiments—Whole Armies—All Dependent Upon the Quality and Quantity of Communication Wires

By Capts. A. M. Shearer and Geo. P. Bush, Signal Corps, U. S. Army

Members: The Wire Association

IN the August issue of **Wire and Wire Products**, the estimated requirements and the most outstanding characteristics of a suitable combat wire were covered in a general way. These characteristics were flexibility, transmission qualities, lightness, tensile strength and life. Obviously no one of these can be considered alone. Neither can a commanding general consider only the manpower of a military campaign. Modern warfare like modern business is dependent upon communication. In peace the establishment of communication can be and is planned months in advance. Repairs, except in time of disaster, are made in comparative safety and extensions are added as the need develops. In war, the communication in a forward zone is planned almost simultaneously with its need, and generally installed to the accompaniment of enemy shell fire. Repairs are extremely hazardous and often cause loss of human life. As a result all wire installed should be the best for the purpose but should not be of such a quality as to prevent furnishing the quantity needed. As an executive of the wire industry just where would you draw the dividing line between quality and production?

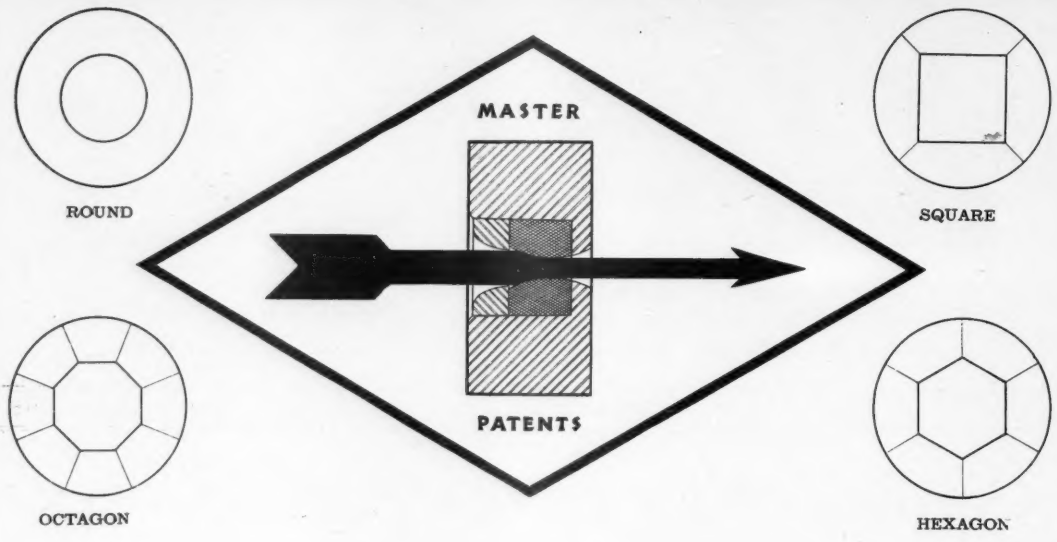
"For want of a nail the shoe was lost; for want of a shoe the horse was lost; and for want of a horse the rider was lost; being overtaken and slain by the enemy, all for want of care about a horseshoe nail."
—Poor Richard's Almanac.

For want of a line the message was lost; for want of a message the order was lost; for want of an order the army was lost; being defeated and forced to retreat by the enemy, all for the want of communication.

Realizing that this might be true, the question of Quantity versus Quality is paramount relative to Signal Corps and even commercial communications. It is hoped that **Wire and Wire Products** will be able to publish the new specification for wire type W-110 so that all members of the Wire Association may have an opportunity to comment.

The Signal Corps has given a great deal of study to this matter and in accordance with common business practice has prepared specifications. It has had the assistance of World War experience, experience of using troops in peace-time maneuvers, and lastly but of the greatest value from a production viewpoint the experience of wire manufacturers who in the past have entered into contract to produce various wires for the Signal Corps. The result of this experience was the adoption of two types of flexible, twisted pair, stranded communication wires commonly called wire type W-40 "Field Wire" and wire type W-44 "Outpost Wire".

From the users' viewpoint, these are satisfactory wires, so the first thought may be that



Tungsten-Carbide Dies

FOR DRAWING

Wire, Rod and Tube

Sizes: .025″ to .750″

Eliminate Your Die Trouble

with

Master Wire Dies

REDUCE POWER CONSUMPTION
IMPROVE LUBRICATION
INCREASE DIE LIFE.

THEIR USE IS RECOMMENDED WITH
DRAWING GREASE OR DRY LUBRICATION.

MASTER WIRE DIE CORPORATION

408 CONCORD AVE.,
NEW YORK ... N.Y.

the problem has been solved. As far as quality is concerned it has been. Quantitatively, however, the huge requirements immediately indicate a great shortage in production. Mass production is vital and any wire adopted must be capable of being produced by practically all members of the Insulated Wire Division of the Wire Association. Other divisions will be involved as well, but the finishing will be in this Insulated Wire Division.

Requirements Indicate Production Shortage

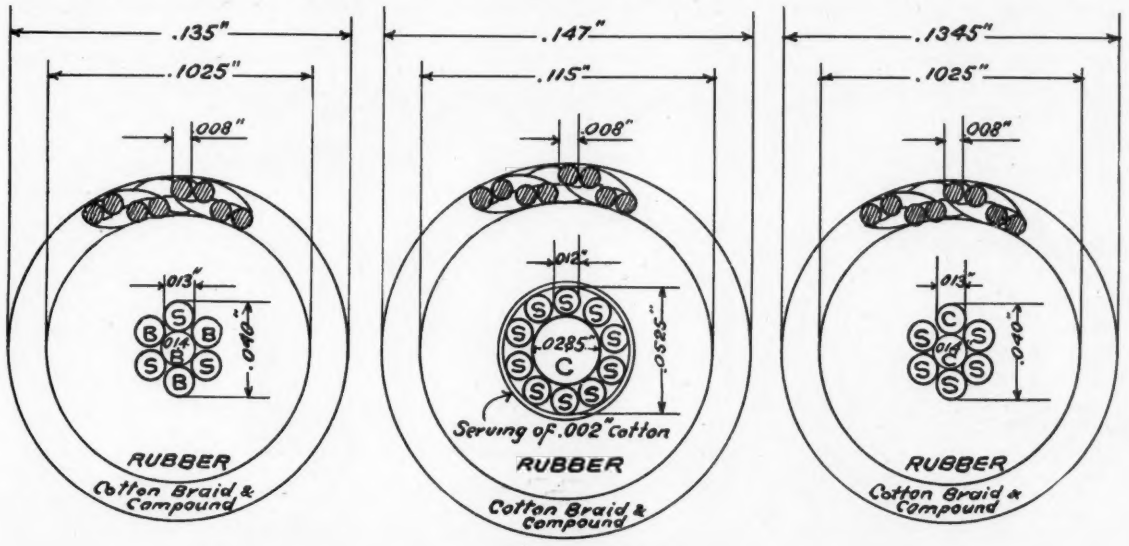
Admitting that quality has been solved, but that quantity has not, the Signal Corps has gone further. It has tried to weigh the various factors of quality versus quantity and has field tested a new wire that may take place of both W-40 and W-44. A specification has been prepared and will be submitted to the wire industry for comment before purchases are made.

As a means of affording a comparison of the wires previously mentioned, the following table is furnished. Please note that a column has been left blank for your use. Can you design a better wire which can be produced in quantity? Remember before you start that the W-44 was for forward areas because of its lighter weight and the necessity of laying it by hand, the W-40 being stronger and having better conductivity was for areas less far to the front and where the lines are longer and laid from horse or motor drawn vehicles. The W-110 is to place both the W-40 and the W-44.

Has the Signal Corps done well in weighing the various

(*Please turn to page 444*)

Wire	W-40	W-44	W-110	Yours
Specification	71-278-F	71-267-C	71-478	
Strands (All tinned)				
Steel	10 of .012"	3 of .013"	5 of .013"	
Approximate T/S	287 M Lbs.	155 M Lbs.	315 M Lbs.	
Bronze	—	3 of .013"	—	
	—	1 of .014"	—	
Approximate T/S	—	92 M Lbs.	—	
Copper	1 of .0285"	—	1 of .013"	
	—	—	1 of .014"	
Approximate T/S	70 M Lbs.	—	70 M Lbs.	
Conductor (No cotton serving)				
Diameter	.0525"	.040"	.040"	
Lay	1" left	7" right	½" to ¾"	
Weight per mile	38 Lbs.	16-18 Lbs.	18 Lbs.	
Specified Breaking Strength	300 Lbs.	103 Lbs.	200 Lbs.	
Insulation				
Compound	30% Para	30% Para	30% Para	
Thickness	1/32"	1/32"	.026"	
Braid	.015"	.015"	#30, 2 ply, 2 end	
Saturation	W. P. & Wax Polish	W. P. & Wax Polish	Asphaltic base & finishing compound	
Finished Single Wire				
Diameter	.147"	.135"	Max. .145" Min. .132"	
Weight per mile	95 Lbs.	56 to 64 lbs.	65 lbs.	
Specified Resistance (DC) in ohms	58	160	132 (Ave.)	
Twisted Pair				
Weight	194 Lbs.	114 to 130 lbs.	130 lbs.	



TYPE W-44 **TYPE W-40** **TYPE W-110**

Cross Section of Single Conductor Combat Wires, Showing the Three Types.

Heat Control in Cable Insulating

Insulation from Early Days to Date — How Lead Sheaths Are Put On—Extrusion Methods

*By Alvin M. Stock**

A GLANCE at the roofs of New York in the crowded apartment districts by even a casual observer will reveal a mass of wire entanglement criss-crossing in every direction, and supported by scarecrow poles, chimneys and cornices. This is the age of radio, and the wires are dubbed "aerials"—radio aerials.

To many this will recall the conglomeration of overhead telephone, telegraph and power lines strung from pole to pole, which cluttered our streets not so many years ago. Yet these lines, unlike the aerials of today, were strong scientifically and with some attempt at systematic arrangement.

The tremendous growth of the telephone and the use of power made it obvious that such overhead practices could not long continue. Today these lines are conspicuous by their absence, for they are buried beneath our streets in suitable conduit ducts, accessible at frequent intervals by manholes.

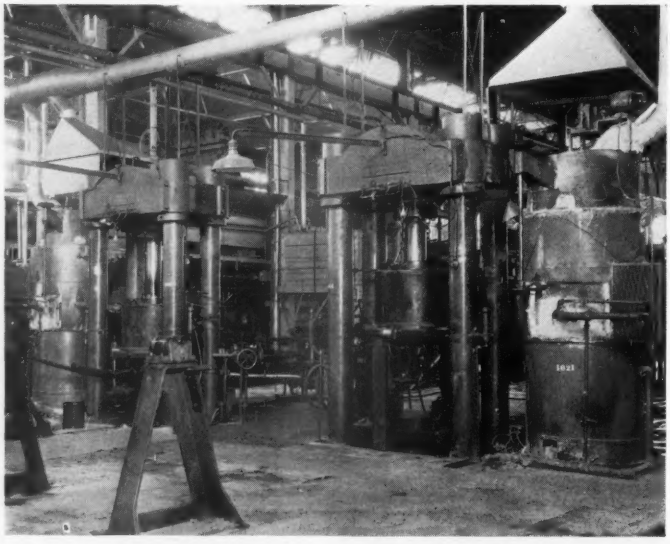
Attempts to lay these wires in the ground date back even to the building of the first telegraph line by Morse between Washington and Baltimore in 1844. Then the wires were encased in lead pipes, but had to be abandoned in favor of the overhead pole method because of imperfect insulation. This first overhead line employed cotton-covered wires supported at the poles by insulators made of glass bureau knobs, and although it was crude, it was essentially the same as present-day construction.

Early Underground Wires Standard

With the perfection of insulating qualities of the cable, however, the laying of underground lines is a matter of weighing the relative construction costs of pole-strung and underground lead-covered cable lines. Despite the increased initial cost of the latter, most of the important trunk lines are being placed underground—as for instance, the line between New York City and Albany. The devastating effects of the elements—i. e., storms, and ice adhering to the overhead lines—have made the subway type the most economical in the long run.

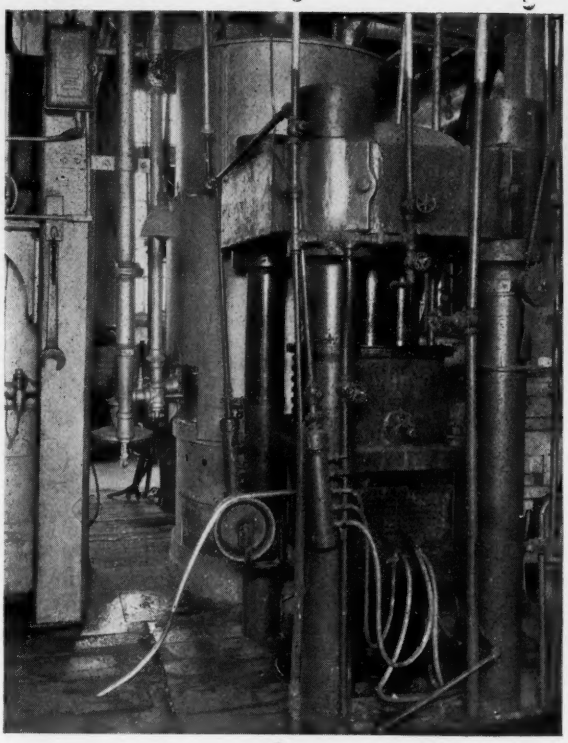
Such cables are usually composed of a number of cotton covered wires arranged in pairs—a 3-in. cable carrying about 1,200 pairs—imbedded in suitable insulating material and then closely wrapped in a number of layers of strip paper impregnated with an insulating fluid to make them quite soft and flexible. Over this is placed the lead sheathing about ⅛ in. thick for physical protection of the cable, and extra moisture proofing.

In the early days the insulated wire was drawn through relatively short lengths of lead pipe and these were soldered together at the joint. The pipe was made by the extrusion of lead through a suitable die block in a lead pipe extrusion press using hydraulic pressure designed and invented by John Robertson over seventy-five years ago. This method was limited because of the short lengths and many joints required, until a new type of press was evolved in which the lead covering was made and applied to the cable in one operation. Wires and cables of any length could be covered with a continuous, close-fitting lead sheath with this press and process. Today the John Rob-

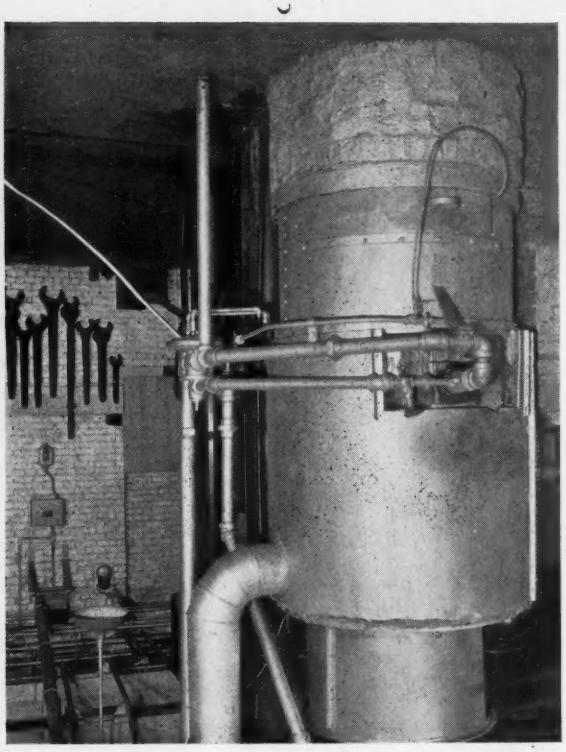


General View of Manufacturing Processes in Plant of Okonite-Callender Co., Showing Extrusion Presses Used in Cable Covering, Also Other Equipment and Control Units.

*The Partlow Corp. Reprinted by special editorial arrangement from *Industrial Gas* New York.



Lead Cable in the Process of Making at the Extrusion Press.



Lead Melting Pot, Showing Automatic Burner and Control Equipment.

ertson Co., of Brooklyn, N. Y., is conceded to be the foremost builders of lead sheathing machinery capable of putting 4,000 lb. of lead on the cable per hour and handling cable in sizes from 1 to 4 in.

How Lead Sheaths Were Put On

The lead is melted in suitable metal pots raised above the hydraulic press cylinder, into which the lead is poured before extrusion, and as a rule is equipped with a bottom pouring outlet and portable spouts to reach this cylinder.

It is here that temperature control plays its important part in maintaining the metal at a pre-determined temperature before pouring, usually from 650 to 750 deg. Fahr., depending on the class of work.

After pouring the water-jacketed cylinder quickly cools and solidifies, and is forced by means of a 10-in. tight-fitting plunger out of the cylinder, and thence through a die block at the lower end of the cylinder. A pressure of about 50,000 lb. per square inch is exerted on the solidified lead. The die block is also heated with gas to about 400 deg. Fahr. so as to insure a steady and uniform flow of lead around the cable, which also passes through the block. The result is a smooth, even sheath of lead encompassing the insulated cable; this is in turn cooled by water so that it can be quickly handled and rolled on the familiar huge spool frequently seen on the street.

Control of Lead-heating Pots

The Okonite-Callender Co., in Paterson, N. J., uses two such lead pots, each of 8,000-lb. capacity, and equipped with Partlow control and gas burner equipment. These burners are of a special nozzle-mixing design, to prevent flash back under sensitive automatic temperature control. They operate with blast air supplied by a small and compact positive pressure fan blower, at a pressure of from 2 to 4 oz. per square inch.

The air and gas pass through separate chambers of a Duplex valve—a tandem valve operated by an extra heavy leather diaphragm. Thus, when a small air pressure is exerted on the underside of this diaphragm it extends, raising the valve in each chamber and thereby permitting the air and gas to reach the burner inlets. Here the combustion mixture is formed and ignites from a continuously burning pilot. By interrupting the transmission of air pressure to the bottom of the valve, the diaphragm distends, allowing the air and gas valve to close; hence the main burner is extinguished. Control of the burner is actually accomplished therefore by controlling the bleed air to the duplex valve. In practice this is accomplished by a quick-acting control valve actuated by a sensitive thermometer element immersed in the molten lead. For simplicity of installation this element is in the form of a capillary tube with bulb at its immersion end, and reservoir well at its power end. It is filled with mercury hermetically sealed so it cannot escape. A minutely

(*Please turn to page 443*)

British Insulated, A Great Cable Company, II

A Description of the Plant, Methods, Equipment and Products of a Famous British Wire Company

By A. C. Blackall

(*Continued from page 403, October*)

THE further operations of bare copper wire are in the Power Cable Department. Mounted on reels in the stranding machine the copper is laid up to form a conductor. Stranding machines are of two main types, high speed for small strands of not more than seven wires and medium speed for larger strands. Machines of the latter type are of considerable size, divided into sections or heads each carrying the requisite number of reels of wire to form a layer of the cable conductor, the direction of rotation being reversed for each successive layer.

Bare aluminum strands for overhead work, both, pure and reinforced, are made in this department, the operation being similar to that of stranding copper.

The copper strand, or cable core, as it may now be called, passes on to the insulating room where, after shaping in a press and twisting if required, is passed through a papering machine, where successive lappings of paper are applied until the desired thickness of insulation is built up.

Where shaped conductors are used in 3 or 4-core cables it is the usual practice at Prescot to pre-twist the core after shaping and before papering. This process, which is patented, ensures that the cores will lie inert in their places in the cable, and that the paper insulation will not be disturbed or strained when laying up.

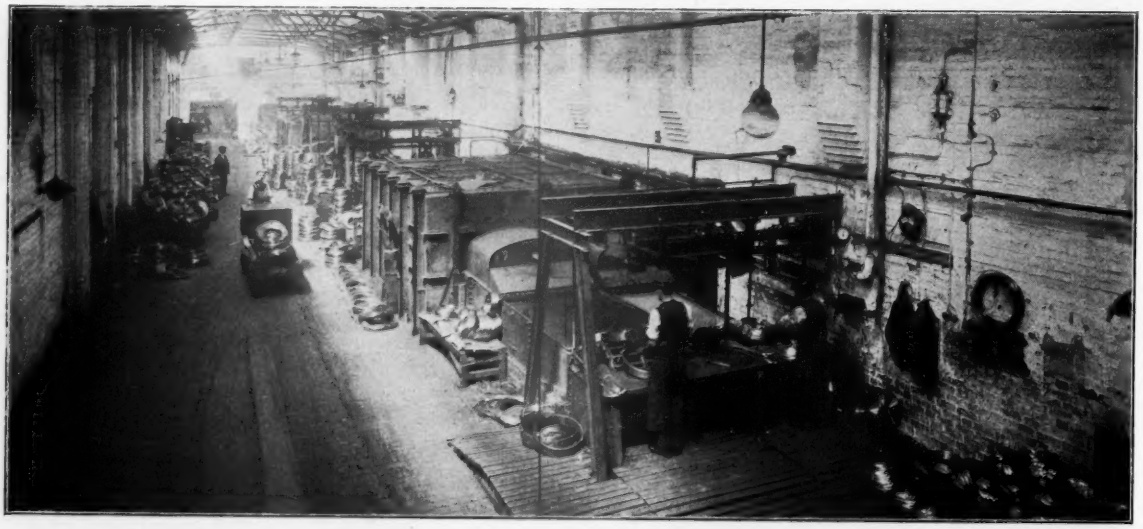
Drying and Compounding Cables

The cores are laid up for the usual filling and additional lappings of paper overall, but in the case of super tension cables which frequently have their own cores screened with copper, there is only a single tape over the three cores.

The next operation is the drying and compounding of the finished cable. The skeleton drum on which the cable is wound is placed in a vacuum tank, so that the cable may be vacuum dried to remove all possible moisture, after which the tank is flooded with insulating compound and pressure applied until the paper is thoroughly impregnated.

The cable is now ready for lead covering and is placed in a tank of compound close to a lead press. It passes through the latter and receives a sheathing of lead, being taken off on the other side on a wooden drum. There are a number of lead presses at the works of various sizes suitable for large multicore cables or small house wires. The smaller presses are also used for extruding resin cored solder, lead strip, lead seals and glazing sections, all regular articles of manufacture.

The cable being ready for testing, it is taken to the test



Annealing Furnaces of British Insulated Prescot Works.

room, a large building, 240 ft. long, with ample floor space for handling drums, also three tanks into which the drums are lowered for their specified time under water. Both sides of the building are occupied by operators' rooms, test bays and galleries, so that the cables can be lifted straight out of the tanks and transferred to the test bays with the greatest convenience. The testing plant includes equipment for testing up to 400,000 volts. Routine testing covers copper resistance, insulation resistance, capacity and the standard pressure test.

After testing, the drum of cable is ready to be lagged up and despatched, unless it has to be armored, in which case it goes to the adjacent armoring shop, at still larger building, 520 ft. long by 100 ft. wide, equipped with machines for both wire and tape armoring. Here the cable receives its protected coverings of compound jute and steel, the whole of the bedding armoring and serving being applied in one continuous operation. As a final test is required after armoring the cable is again returned to the test house to be again pressure tested, after which it is ready for despatch.

Next to the armoring shop is the latest addition to the main buildings, laid out as a complete cable factory, where stranded copper enters at one end and the finished lead covered cable leaves it at the other. This building is 520 ft. long by 105 ft. wide, with three cranes spanning the entire width, while apart from the roof lights, both sides are glazed, in order to give maximum natural lighting, the windows being the largest of their type in this country.

Where Experimental Work Is Done

The experimental work is carried out in a special test room and outdoor test ground where cables are laid in the ground and tested for power factor, heating under load, etc., and problems connected with the behavior of super tension cables can be examined. Much useful work of both domestic and national interest has been carried out here during the past few years, and the latest type of 33,000 volt screened cable has been evolved in the light of the experimental work carried out.

Materials Bought to Specifications

All materials used in cable composition is bought to a specification, and is sampled and tested when delivered in the company's laboratories where analysis of oils, photo micography of metals, chemical and physical tests of all kinds of paper, lead, etc., and quantitative analysis of by-products are a daily routine. Much experimental work is also carried out in the laboratories and the solution of many problems arising in the manufacture and laying of cables would be impossible without the assistance of this department. The export bay in which the cable is loaded up for rail or road transport is a steel framed structure 580 ft. long, with ample roof lighting, and is equipped with a 15-ton travelling crane. Cable awaiting shipment or for stock is stored in a spacious drum yard which adjoins the export bay and is equipped with a travelling Goliath crane which covers the whole area.

There are three more principal outlets for wire: Telephone cables; cotton-covered and enamelled wires, and braided aerial cables; bitumen- and rubber-insulated cables and wires. The wire for the third of these groups is tinned, and sent to Helsby works.

Telephone cables for public services are invariably of the dry core type, so called because the paper with which they are insulated is dry, and not impregnated with oil or compound as in power cables. The problem is to support the individual wires in position in the cable, while reducing the quantity of solid insulating material to a minimum and providing as much air space as possible in order to keep the electrostatic capacity low. Each copper wire is therefore loosely wrapped with a paper light in texture but mechanically strong, anod pairs of these wires are twinned together forming the lead and return of the telephone circuit. The requisite number of twins is then built up in a machine similar to that used in the stranding of copper, but furnished with a very large number of bobbins, there being a separate head on the machine for each layer of cable, the direction of rotation being reversed at each head. When laid up the cable is tested for continuity of the wires of which there are over 2,000 in a cable.

Extruding the Lead Sheath

The core then goes to the drying and lead covering room where the last trace of moisture is extracted and a lead sheath extruded onto the cable. Here arises an interesting point. The layman in thinking of lead covering supposes the lead fastened hard on to the cable. This would be fatal to a telephone cable which is soft—not solid, like a power cable. The lead press extrudes a sheating of definite diameter, and, within limits, any size of sheath can be put onto the cable, in fact the sheath can be made without a cable in it similar to a water pipe. After testing in a specially equipped test room for capacity, insulation, etc., the cable is ready for despatch.

In the cotton covering department the bare copper wire is covered with every variety of cotton or jute lapping or braiding. Small wires are cotton covered on multiple head high machines, running so fast that the bobbins seem to be "asleep", while larger wires are covered on other types of machines running at lower speeds and adding one or more lappings simultaneously. In the braiding shop are applied cotton braids to round or rectangular conductors, for dynamo, motor, and transformer windings. Two galleries full of braiding machines run the

(*Please turn to page 439*)

Structure and Conductivity of Hard-drawn Copper Wire

Effect of Direction of Drawing, Crystal Orientations, Changes in Specific Resistivity

By R. W. Drier and C. T. Eddy†*

THE conductivity of copper wire is of prime importance to the electrical industry and consequently to the copper refiner and wire manufacturer. Annealed copper wire has a higher conductivity than hard-drawn wire, but, on the other hand, its tensile strength is lower. This is only a partial and preliminary report on some of the work done to date on a research program of which the object is an intensive study of copper. It is offered with the hope that, though it is not an exposition of the most rigorous of conclusions, the general trend of inferences which may be drawn will be of value and interest.

Effect of Direction of Drawing

In 1928 some work was done on hard-drawn copper wires to determine whether wire drawn in a continuous machine (that is, all in one direction) would have a different structure from wire that had a reversal in direction at some stage of the drawing process.

The diffraction spectra obtained indicated that as the position of the wire rayed approached the core, a preferential crystal orientation existed, and that the closer to the core the more preferred was the orientation. The data obtained partly corroborated the work done by Schmidt and Wasserman[1] and by Clark[2].

The samples selected for use in both the diffraction work and the resistivity measurements were taken from Nos. 6, 8, 10 and 12 gage (B & S.) commercial wire, both hard-drawn and annealed. The wire was produced from standard 220-lb. wire bars, hot-rolled to ¼ in. and hard-drawn in one direction to size. In addition, observations were made on 10-gage wire which was drawn from a piece of native copper without melting. The annealed wires used were subjected to a temperature of 820° F. for 1 hr. and 15 min.

Table 1 gives data relative to the composition and conductivity of the wires discussed in this paper.

Table 1.—Composition and Conductivities of Wires Discussed

Wire	Metal Content, Cu+Ag	As	Conductivity, Per Cent.
No. 12, hard-drawn	99.94	0.000378	97.7
No. 6, hard-drawn	99.94	0.000378	97.8
No. 6, annealed	99.93	0.000370	99.8
No. 10, hard-drawn from native copper	99.96	0.000310	99.8
No. 10, same as No. 10, but annealed	99.96	0.000310	102.5

In order to study the changes in ultimate structure from the surface to the core of the wire and to observe any changes in conductivity which may accompany these structural changes, observations were made on wires whose outer layers were removed in successive stages by dissolution in 25% nitric acid. The etching was carried on in such a manner that the diameters of the wires were reduced in stages of approximately 0.5 mm. Various methods of etching were tried, all of which yielded identical results. The method that was adopted consisted in placing the wires in a nearly vertical position in a cylinder and causing them to rotate by mechanically agitating the solution. For each stage, after one-half of the etching was accomplished, the wire was turned end for end in the solution and the etching completed. It was generally observed that as the hard-drawn wires etched the cross-section gradually became elliptical. The difference between the lengths of the major and minor axes of the cross-section at the core was found to be as great as 50%. In the annealed wires this elliptical etching was not observed and the cross-section remained practically circular to the core.

The diffraction patterns were obtained from samples that were taken immediately adjacent to those used for the resis-

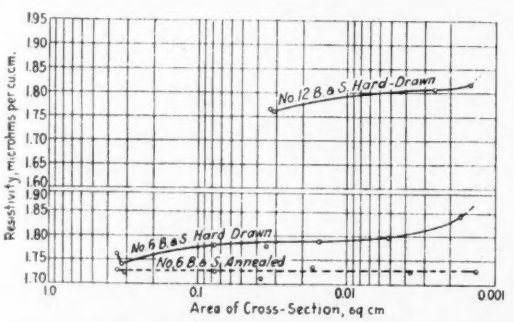


Fig. 1—Curves correlating resistivity changes with changes in the cross-sectional area of the wire.

*Röntgenologist, Michigan College of Mining and Technology, Houghton, Mich.

†Department of Physical Metallurgy, Michigan College of Mining and Technology abstracted from paper presented at Cleveland meeting, Amer. Inst. Min. & Met. Engs., 1929.

[1]Ztsch. f. Metallk. (August, 1927) 325. Ztsch. f. Phys., 24, 779.

[2]Heat Treating and Forging (1928) 257.

tivity measurements. In addition, diffraction patterns were taken of the original wires (those used for the resistivity measurements) before etching and after the last etching had been made and the resistivity determined. These latter patterns agreed precisely with the first and last patterns of the series made from a single wire.

Microscopy

A microscopic study of the wires was made but no difference in structure was observed between the material at the surface and that near the core. The ends of the wires were etched to approximately 0.5 mm. dia. in order to observe the relative directions of the minor and major axes of the elliptical cross-sections which seemed to persist in hard-drawn wires. Longitudinal sections were then made relative to these axes and the microstructure was studied. No structural differences were observed in these sections and all revealed uniform elongated grains similarly oriented and presenting the ordinary slip structure of hard-drawn copper. The transverse sections were also investigated and showed no essential difference throughout. This work corroborates that of Harris[3].

Diffraction

The diffraction work was done on a General Electric unit, late model, using a molybdenum water-cooled target Coolidge tube, operating at 20 ma. and 30,000 volts. The familiar Hull cassette with zirconium dioxide filters as an integral part of the cassette was used. The filters permit transmittance of radiation which approximates the monochromatic.

The sample in wire form was placed in the cassette in the slot meant to support a capillary tube of an unknown. The wire was adjusted in the slot so that its top surface was bathed by the central beam. Diffraction patterns were obtained of the several sizes of wires mentioned. Spectra were obtained of each wire in its separate stages of etching. The patterns of the different wires were so similar that it was felt that a single series would be representative of them all.

The preferred orientation first became noticeable when the wire was etched to a diameter of 2.96 mm. and became more pronounced as the core was approached. If in the pattern of the surface or skin of the wire the line intensity for the 110 planes is arbitrarily taken as 10, the following relative intensity changes occur:

The 111 planes decrease from 10 to 0.

The 220 planes do not vary perceptibly.

The 220 planes practically double their intensity.

The 311 planes decrease from 8 to 3.

The second order of 111 planes practically disappears.

The second order of 100 planes does not vary.

The third order of 111 planes disappears.

It is fairly easily deduced from the preceding data that the orientation is one in which a cube edge is parallel to or in the fiber axis and normal to the plane of the X-ray beam.

As mentioned, the wires became somewhat elliptical in cross-section as they approached their cores. Peculiarly, the patterns taken with the X-ray beam parallel to the major diameter of the eclipse differs from that perpendicular to the major diameter. When the beam is parallel to the minor diameter the spectral line representing the 111 planes becomes slightly visible again.

With the exception of the reappearance of the 111 lines, the evidence is all in favor of an orientation that would permit the 110 planes to be parallel to and rotate along the plane of the X-ray beam. The cube edge being parallel to the direction of drawing, that is, the fiber axis, would be one of such orientation. This would permit maximum reflection (on a Hull pattern) from the 110 planes and a minimum from the 111 planes. The authors are of the opinion that such is the preferred orientation as the core is approached.

Resistivity Measurements

For the determination of the changes in specific resistivity throughout the sections of the

(*Please turn to page 436*)

Table 2.—Change in Specific Resistivity with Cross-sectional Area

Wire B. & S. Gage	Area at Section, Sq. Cm.	Specific Resistivity, Microhms per Cu Cm.
No. 12, hard-drawn	0.0333	1.764
	0.0314	1.762
	0.00255	1.808
	0.00149	1.819
	0.00129	1.914 *Max.
No. 6, hard-drawn	0.1350	1.762
	0.1323	1.738
	0.0782	1.781
	0.0349	1.775
	0.0151	1.789
	0.0052	1.797
	0.00172	1.841
No. 6, annealed	0.1350	1.728
	0.1320	1.721
	0.0775	1.726
	0.0378	1.712
	0.0172	1.736
	0.00371	1.727
	0.00134	1.729
No. 10, hard-drawn from native copper	0.0557	1.729
	0.0529	1.698
	0.0137	1.745
	0.00288	1.793
	0.00135	1.840
No. 10, same as No. 10, but annealed	0.0555	1.683
	0.0132	1.628
	0.00295	1.682
	0.00141	1.725

[3]F. W. Harris: Distribution of Tensile Strength in Hard-drawn Copper Wire. Proc. Inst. Metals Div., A. I. M. E. (1928) 518.

NEWS *of the* INDUSTRY

Foreign Trade Opportunities reported by the Bureau of Foreign and Domestic Commerce during the month of October include inquiries for wire or wire products from the following sources; Wire insulating lacquer (47593) Budapest, Hungary; electrical insulating materials (47572) Paris, France; cut nail making machinery (47564) Concepcion, Chile; tin foil strips (47532) Montreal, Canada; bolts and nuts (47644) Bombay, India; braiding machinery for covering rubber tubes; asbestos insulated copper wire (47806) Berlin, Germany; iron and steel bars, flats, hexagonal bars (47772) Bombay, India; plain and barbed wire (47738) Sao Paulo, Brazil; nut, bolt, and wire drawing machinery (47793) Bordeaux, France; screw cutting machines for bolts and nuts (47760 Haale, Germany; brass bars, extruded brass and bronze sections. 47788) Bombay, India; copper cable terminals (47875) Bulawayo, South Africa; telegraph and telephone equipment Africa; bolts, nuts and screws (47873) Johannesburg, South (47911) Cairo, Egypt; iron and wire nails (47899) Jedda, Arabia; collapsible tubes for shaving and dental creams (47894) Hong Kong, China; wire (47995) Rio de Janeiro, Brazil; nut, bolt and wire-drawing machinery (47927) Toulouse, France; copper scrap (47880) Hamburg, Germany; fancy buckles and ornaments (47888) Montreal, Canada.

Big Attendance at Twelfth National Metal Congress

The Twelfth Annual National Metal Congress and Exposition held at the Stevens Hotel, Chicago, the week of the 22nd, showed an attendance in excess of the previous year and also increased enthusiasm on the part of both visitors and exhibitors. Many actual orders have been placed with exhibitors and in other ways the display has proven profitable to them.

It was estimated that the total registry reached 6,000, a figure much higher than that attained last year. The American Institute of Mining and Metallurgical Engineers ended all its sessions on Thursday, but the American Society for Steel Treating, the American Welding Society, and the American Society of Mechanical Engineers continued their sessions through Friday, the last day. The sessions in general were by groups and the papers and reports presented were of a technical nature.

Wire Cartel Fixes Quota and Prices

At a meeting at Liege, Sept. 11, the European Wire Cartel fixed tonnage for fourth quarter at 360,000 tons and reduced prices by 5 S. Though sales are difficult due to general depression and in some countries to United States competition, the cartel's existence is declared not to be threatened. Arbed (Acieries Reunies de Burbach-Eich-Dudelange) and Socobelge (Societe Co-operative Belgique) have arranged to undertake the sale of the products of the biggest Belgian wire plants outside the Clouteries de la Paix, thus accelerating the proposed reestablishment of the Belgian and continental wire syndicates.

German Wire Mills Use Heavier Rods

German wire mills are beginning to follow the American practice of drawing wire from heavier gage rods. Most German mills have largely used Nos. 2 to 4 gage rods, while American mills draw a considerable tonnage of Nos. 5 and 6 gage. German mills have found that by using the heavier wire rods, better and stronger nail wire is drawn.

Huge Copper Cable Order

The Anaconda Wire Co., a subsidiary of the Anaconda Copper Co., has received from the Pacific Gas & Elec. Co., an order for 4,250,000 lbs. of hollow cable conductor, particularly adapted to high-voltage transmission. It will be used in the construction of a 220-kilovolt double circuit transmission line between Tiger Creek in the Sierra Nevada Mountains and Newark on San Francisco Bay, it was announced yesterday.

Wire Lower in Germany

The price for wire rods c.i.f. Houston Mobile has been reduced to $32.50 and for large orders $32.0 cif, the price for San Francisco/Seattle is 50 c higher.

The German wire rope makers report that orders from the United States, which usually amount to a few hundred tons monthly have dropped to the lowest figure since 7 years. It is expected however that this business standstill is a temporary one only, and that business will improve in the Autumn months.

Production of steel wires made of corrosion-resting steel (chiefly copper bearing and also ARMCO iron—which is produced under license by the vereinigte Stahlwerke) is showing a quick gain. The monthly average production in 1927 was 780 tons, 8,877 tons in 1928, 3,400 tons in 1929 but is now—although the total wire production is much lower—approximately 3,800 tons monthly. The agricultural districts are the main consumers but up to 25% is sold for export. The production of stainless steel wire (Nirosta) is also growing and the production rose from 80-90 tons monthly in 1927 to ap-

proximately 250 tons at present. The electrical, chemical, etc., industries are the main consumers and approximately one-third is absorbed by the export trade.

The European makers of insulated wires, except the British and Swedish have established a cartel, which is distributing export orders according to fixed allotments.

Monel metal wire cloth, which is amply produced both in America and Great Britain is produced only in very small quantities in Germany, Belgium and France. The consumers on the Continent have not yet given attention to this product, so that almost the total small production is sold for export, chiefly to South Africa, Canada, Chile and Great Britain. The price of one roll of monel metal cloth 12 mesh 50x21 is $7.70.

Cables for the Electric Tote

The introduction of the totalizator on the English race courses has created a demand for a special type of cable for connecting the apparatus in the ticket issuing booths to the main equipment. British Insulated Cables, Ltd., have supplied considerable quantities of these cables, a recent example being composed of 300 conductors, of 10 lbs. per mile, lead covered and single wire armored, with specially heavy impregnated hessian tapes under and over the armor.

Brief Personal Mention

Stanley M. Tracey, treasurer of the Driver-Harris Co., Harrison, N. J., was tendered a dinner on Oct. 9th by his associates in celebration of his 20 years' service with the company. He started as office manager of the American Wire Cloth Co., a subsidiary company, and was elected treasurer and director in 1922. In 1929 he also became director of the British Driver-Harris Co.

—

Roy V. Wright, managing editor of "Railway Age," has been elected president of the American Society of Mechanical Engineers for 1931. Other officers elected were: William A. Hanley, Chief Engineer, Eli Lilly Co., Indianapolis, Ind.; Thomas R. Weymouth, President, Oklahoma Natural Gas Corp., Tulsa, Okla.; Harvey N. Davis, President, Stevens Institute of Technology, Hoboken, N. J., as Vice-Presidents; and W. L. Batt, President, S K F Industries, Inc., New York, N. Y.; H. L. Doolittle, Chief Designing Engineer, Southern California Edison Co., Los Angeles, Calif., and H. L. Whittemore, Chief, Engineering, Mechanics Section, Bureau of Standards, Washington, D. C. as Managers.

—

H. W. Gillett, director, Battelle Memorial Institute, Columbus, O., has accepted chairmanship at the American Society for Steel Treating. Others who have accepted chairmanship are H. J. French, International Nickel Co., Bayonne, N. J.; Donald G. Clark, director of sales, Firth Sterling Steel Co., McKeesport, Pa.

—

H. J. Kelly, general manager of the Dominion Steel & Coal Corp., Sydney, N. S. has been elected a director and vice president. Mr. Kelly has been in the steel business about 39 years, for 30 of which he was assistant superintendent for the Bethlehem Steel Corp.

—

Howard C. McNeil, Illinois Iron & Bolt Co., Carpentersville, Ill., has been elected president to succeed John F. Fierke, who has been president of the corporation for the past 32 years.

COMING EVENTS

Dec. 1-6. 51st Annual Meeting, Amer. Soc. Mech. Engs., Engineering Societies Bldg., West 39th St., New York. Sec'y., Calvin W. Rice.

Dec. 1-6—National Power Show. 9th Nat'l. exposition of power and mechanical engineering, Grand Central Palace, New York. Charles F. Roth, Grand Central Palace, New York, manager.

Dec. 11 — American Standards Association. Annual meeting, Engineering Societies Bldg., New York. P. G. Agnew, 29 West 39th St., New York, secretary.

Jan. 26-30, 1931—American Institute of Electric Engineers. Annual winter convention, New York. F. L. Hutchinson, 33 West 39th St., secretary.

Obituary Notices

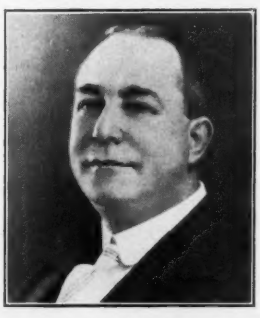
Edgar Munson, prominent Williamsport lawyer and business man died at his home near Muncy, Pa., October 6th. He was 49. Mr. Munson was vice president of the Williamsport Wire Rope Co., and the Williamsport Savings Institution, president of the E. Keeler Co.

—

Don Arbuckle, production manager, Continental Steel Corp., Kokomo, Ind., died, Sept. 19, following an operation. He was associated for many years with the Kokomo Steel & Wire Co. prior to its absorption by the Continental Corp.

—

Frank L. Driver, Sr., Chairman of the Board of Directors and one of the founders of the Driver-Harris Co., Harrison, N. J., died in Belgium Aug. 26, 1930, where he had resided for 5 years due to ill health. Mr. Driver founded the company in 1899 and was associated with it until his death. Always keenly alive to improvement and expansion, it was largely due to his foresight and pioneering that the industry has grown to its present proportion. He was interested in politics in Newark, where he resided many years, and the charm of his personality w o n him many friends. He was at one time a member of the Board of Freeholders and the Shade Commission. Mr. Driver was born in Brooklyn, N. Y., on July 4, 1870.

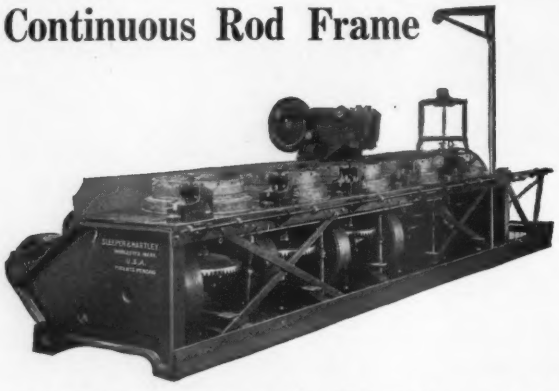


Frank L. Driver, Sr.

Sleeper & Hartley
TRADE MARK

A FLOOD OF DR

Continuous Rod Frame



(Patented June 3, 1924—May 12, 1925—Others pending)

Capacity—No. 5 rods to No. 14—15 wire.

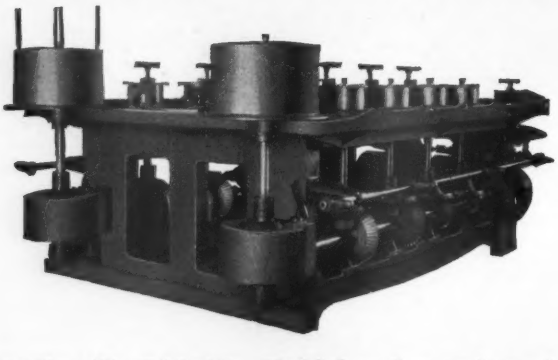
Automatic Compensation for Speed of Heads.

Ball or Roller Bearings used Throughout.

No Differential Gearing Whatever.

Made with 3, 4 or 5 Blocks as Desired.

Double 5-Draft Dry, Intermediate



Capacity—No. 14 to No. 23, high or low carbon wire.

Average Operator handles 3 to 4 blocks.

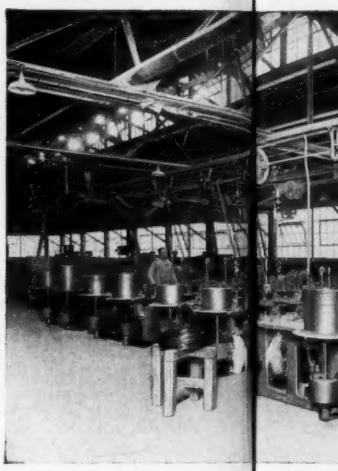
Daily Runs—No. 14-19 wire (4 hole), 1400 lbs. per Block.
No. 14-20 wire (5 hole), 1100 lbs. per Block.

More than 550 heads of this improved model in continual operation

Are you equipped, Mr. Wire M Super
fighting competitors at their own game?

SLEEPER & HARTLEY CONTINUS WI
production record holders, are trade-proo

These machines will assure you when c
a solid advantage in a tough, he-n's game



Battery of Double Six-Dr Dry
Drawing High Car Wire in
The Thompson Wire., Wo

Capacity—No. 16 to No high or
Average Operator cares four blo
Daily Runs:—4000 lbs. carbon
3000 lbs. carbon

Direct driven with silent chain gears t
bearings. Variabled for fini

American Agents

NEW YORK TERRITORY—Triplex Machine Tool Co.
PHILADELPHIA TERRITORY—Swind Machinery Co.
CHICAGO TERRITORY—Neff, Kohlbusch & Bissell, Inc.
SAN FRANCISCO—L. G. Henes Machine Tool Division of Jenison Machinery Co.
LOS ANGELES—L. G. Henes Machinery Co.

SLEEPER & HA
WORCESTER, MASS

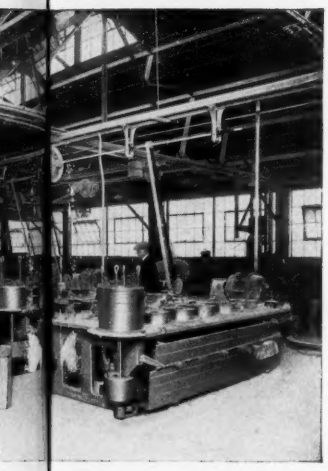
ORDERS

Sleeper & Hartley TRADE MARK

Wire Superintendent, to match hard-
own me?

NTINUS WIRE DRAWING MACHINES,
re trble-proof and inexpensive to operate.

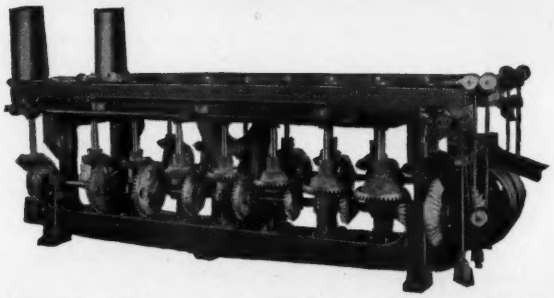
re yowhen crders do come flooding in, of
he-n's game.



x-Dr Dry Continuous Machines
n Car Wire in the Plant of
Wire Co., Worcester, Mass.

to No high or low carbon wire.
ares four blocks (two machines).
0 lbs. carbon wire in 10 hours.
0 lbs. carbon wire in 10 hours.
chain gears throughout. Anti-friction
ariable for finishing block.

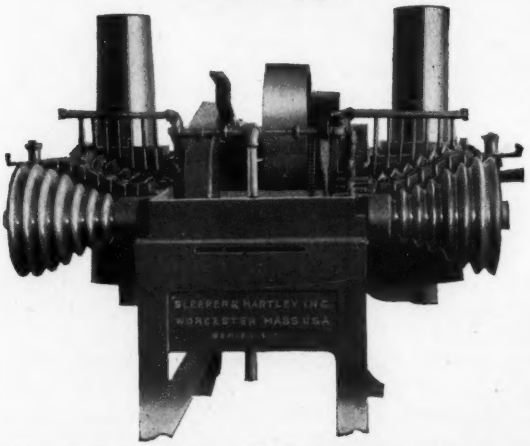
Double 8-Draft Wet, Fine Wire



Capacity—No. 22 to No. 36, high or low carbon wire.
Average Operator handles six blocks.
Daily Runs—No. 22-33 wire (8 holes) 660 lbs. of wire per 10-hour working day.

We have manufactured several thousand of these heads for Wire Mills throughout the country

Improved Double 8-Draft Wet, Cone Type



Capacity—No. 13 to No. 24, high or low carbon, or the finer woven screen wires.

Average Operator runs 6 to 12 machines, producing up to 1500 pounds of wire per day.

Machines staunchly built in six or eight drafts. Cones travel at 135 R. P. M., and draw 283 feet of wire per minute.
Floor space—5′ 6″ by 4′ 6″.

HARTLEY, INC.

TER MASS., U. S. A.

Foreign Agents

UNITED KINGDOM—Mr. Fredk. A. Perry, 63 Queen Victoria St., London, E. C. 4

MONTREAL AND TORONTO—Arthur Jackson Machine Tool Co.

AUSTRALIA AND NEW ZEALAND—Edwin Wood Pty. Ltd., Melbourne

JAPAN—Andrews & George Co., Tokyo

Hard Metal Substitutes for Diamonds

Composition of Various German Extra-hard Metals—How to Prepare and Care for Dies—Lubrication—Precautions

*By A. Ackermann**

TESTS made to replace diamond dies in wire drawing by means of a material approximating them as to hardness and usability, and thereby cheapen the manufacturing process in the wire industry, go back to pre-war times when prices of diamonds, owing to restrictions on production, were continually rising. The work in this connection however led to the production of a metal alloy which, although not capable of entirely replacing the diamond in all cases, is becoming an important tool for the wire drawing industry; it increases production and, by obtaining an absolutely accurate-graded wire with smooth surface, improves the quality and increases the uses for the wire. The great conversion process caused by conditions in which the wire industry found itself; the introduction of high speed multiple drawing machines instead of the single drawing benches hitherto in use, also the thicker wires, opened up a large new field for the diamond substitute material. It is not too much to say that the hard metal die has a future before it as it is suitable for supplanting the diamond and can take the place of all draw plates hitherto used for drawing thick wires.

The First Hard Metal Compounds

In producing artificial drawing dies it was first endeavored to make same of compounds of tungsten, titanium, iron, chromium, cerium and carbon. A compound of 75 to 95% of tungsten with 25 to 5% of cobalt proved most favorable. The component parts obtained from tungsten acid and cobalt oxide are mixed, granulated aluminum being used as reaction; the metal is then won by pouring. Another kind of hard metal consists of a conglomerated hard metal alloy composed of tungsten carbide with 3 to 7% carbon content and an agent with lower melting point than tungsten as binding material, such as nickel, cobalt or iron. A quantity of at the most 10% of these admixture metals is used. Also in this alloy the tungsten metal forms the main part which amounts to at least 80% of the composition. Drawing dies made of this conglomerated and pressed material are harder than the cast dies. The most important requirement which the wire drawer places on substitute dies is, besides their hardness, the absolute and uniform density of the material, as otherwise when drawing the wire the die contracts in the drawing channel, forms knots and the wire breaks. Further the drawing dies must not have bubbles in the interior as these will act like pores in the drawing channel and the die will become useless.

Before using the die it must be tested with a magnifying glass and all dies which are not perfect must be rejected. The polish of the drawing channel must be perfect; if the drawing channel has rough places the wire will tear.

Advantages—Low Price, No Cracking

The advantage of the hard metal die as compared with the diamond drawing die lies in the first place in its considerably lower purchase price. Besides which the danger of cracking exists with the diamond in the case of high stresses, even though the hardness of the diamond is not attained by the hard metal. The hard metal die if taken in the proper size can be used from 0.20 mm. to 2 mm. diameter by suitable polishing up, the price being low, whereas the price of the diamond in the same instance is considerably higher.

As compared with the drawplates hitherto used, the advantage presented by the hard metal dies is great. The low price and the more economical using up of the drawing die are of little importance as compared with the advantages offered by the hard metal die. Whereas the drawing plates do not keep their gauge long and after a short time the bore of the plate is so much worn that it is necessary to re-adjust the plate, it is possible through the hard metal die to draw many times the quantity which can be drawn with the drawing plate, besides which the wire drawn through a hard metal die has a much more shiny and smooth appearance so that the quality is improved. Its utility is increased and the production augmented because hard betal dies enable higher drawing speeds.

Drawing Work About the Same

Drawing in hard metal dies does not differ from that in diamonds or drawing plates. It must be seen that the wire before the first pull is absolutely clean. If possible the wire should be blank annealed before drawing as black annealed wire more easily attacks the polish of the die as annealing slag often adheres thereto. It is advisable

(*Please turn to page 437*)

*From *Drahtwelt*, Germany.

RECENT WIRE LITERATURE

High Voltage Cables

Emanueli, chief engineer of the Pirelli works in Italy, is known as one of the foremost electric cable men in the world, consequently this translation of five lectures by him on the broad general subject of high voltage cables will be welcomed by all production men in the cable field as authoritative. It has been translated by William A. DelMar, chief engineer, Habirshaw Cable & Wire Corp., Hastings-on-Hudson, New York, who contributes an introduction as well.

In this, Mr. DelMar refers to an interesting point and that is the modesty with which Emanueli glosses over his original and valuable contributions to the art of cable construction, notably his extremely practical work on the oil-filled form which he converted from virtually an imperfect theory to an unit transmitting 132,000 volts in thoroughly satisfactory everyday use on two continents.

The work, as a whole deals with principles rather than details of practice, altho the broad treatment of the latter-day physics of thermal, capillary and pressure effects will make it valuable to all cable engineers. These will be found largely in the last two lectures, entitled "The Dielectric of a Cable Considered from the Point of View of Its Impregnation" and "Mechanical and Electrical Properties of the Finished Cable" respectively. Much valuable material on the subject of paper, compound, and oil insulations will be found in the former, and on the influence of lead sheathing on the various properties.

He points out, for instance, that the thermal expansion coefficient of the impregnating material may be considered as equal to 8 ten-thousandths for 1 deg. C. That of the copper and the paper are both very small when compared with that of the oil, as the following figures show:

Oil	0.0008
Copper	0.00005
Fibres	0.00009

When the lead sheathing becomes heated it expands and the volume contained in it also expands. This increase of volume, however, is far from being sufficient to correspond to the increase of volume of the compound. Then he proves these statements by a practical example and figures (pages 75 and 76).

High Voltage Cables, by L. Emanueli. 5¼x8½, boards, 107 pps. and Introduction, 81 ills. including 9 full page plates, John Wiley & Sons, Inc., New York & London, $2.50 net.

High Voltage Cables

The literature of this big subject is enriched at this time by another valuable work, the product of P. Dunsheath, best known as research and technical manager, W. T. Henley's Telegraph Works Co., London. It, too, is in the form of a series of lectures, these having been delivered at University College, London, during the Fall of 1928.

If it might be put in that way, without comparison, this book deals, after a general chapter and several on the theory, with the more practical side and many of the more important details of cable making are considered at some length. Thus, the tenth and last chapter deals almost wholly with details of construction and use of oil-filled cables which Emanueli modestly dismisses in a paragraph or two. In this he describes the various installations of oil-filled cables from the first of about 2,000 ft. of three cables, each of 50 sq. mm. section, laid in Italy in 1924 and which has carried currents of 250 amperes per phase at 132,000 volts satisfactorily. Two years later the important installations for the same voltage at New York and Chicago, each designed to transmit 90,000 kVA., were put in hand and have now been operating satisfactorily since they were put into use in the Summer of 1927. The New York line connects Hell Gate Station with Dunwoodie, 12 miles away, and is a most important link between New York and the north, while in Chicago the line runs from the Northwest Station to the city line, 6 miles north, where it is connected to a 30-mile overhead line. The New York line is in process of being duplicated. The conductor is made up of two layers of copper wires each 103.5 mils diameter stranded over a spiral of hard-drawn copper tape of special section to produce resistance to oil flow. The principal dimensions are as follows:

Clear diameter inside spiral	0.75 in.
Diameter inside first layer of conductor	0.85 in.
Outside diameter of copper	1.22 in.
Thickness of insulation	0.72 in.

There are two lead sheaths with a spiral lapping of hard-drawn copper tape between them, and having a layer of impregnated paper above and below. The object of the spiral armoring is to withstand the internal pressure generated momentarily on the application of a load to the cable, and the second lead sheath is to provide a smooth surface from the drawing of the cable into ducts (pages 149, 150, 151, et seq.).

High Voltage Cables, by P. Dunsheath. 5½x8½, boards, 161 pps. and Foreward, 117 ills. many full pages, bibliography at end of each chapter, Isaac Pitman & Sons, New York, London, Toronto & Melbourne, $3.00.

LEEDS and Northrup Co., Philadelphia, are mailing their new Booklet No. 90 describing the new Hump method for the heat treatment of steel. In addition to expanding on the theories of change in the internal structure of steel, causes of failure, and ideal conditions for correct hardening, it describes the use of the process in such applications as forming punches, dies and molds, drop forge and die-casting dies, and production hardening.

A REVIEW *of* RECENT PATENTS

No. 1,772,436, ELECTRICAL CONDUCTOR, Patented Aug. 5, 1930, by Otto A. Frederickson, Wethersfield, Conn., assignor to The Wire-Mold Co., of Hartford, Conn., a Corporation of Conn. This inventor applies a coating of sterin pitch or other fire-repellant compound directly to the outer surface of the rubber jacket which encloses the wire conductor, so that the pitch will form an air-tight coating over the rubber to prevent deterioration and hardening of the rubber due to oxidization and at the same time protect the jacket from fire.

No. 1,772,948, WIRE DRAWING APPARATUS, Patented Aug. 12, 1930, by Frank Honig, of Oak Park, Illinois, assignor to Cyclo Corp., Chicago, Ill., a Corporation of Ill. According to this patent, the rod is taken from one end of the coil of such stock and is drawn through reducing dies and the wire which results is coiled about a stationary drum from which the coil is discharged onto a spool and, from time to time, as may be necessary, the final end of the coil of stock which is being drawn into wire is welded and swaged to the advance end of another coil of stock, the arrangement and operation being such that the successive coils of stock can be welded together to enable the wire-drawing operation to be continuous.

No. 1,774,545, APPARATUS FOR COMPRESSING AND ASSEMBLING COILED SPRINGS, Patented Sept. 2, 1930, by Harry Chapman, Chicago, Ill., assignor to Chapman Bros., of Chicago, Ill., a Corporation of Ill. An object of the invention is to provide means whereby the wire springs may be compressed in a horizontal position and then turned to a vertical position to facilitate the handling of the springs as well as their insertion into the pockets, means being provided to prevent the springs from "flying back" or out of the machine during the operation of the machine.

No. 1,774,880, DRIVING MEANS FOR WIRE STRANDING MACHINES, Patented Sept, 2, 1930, by Daniel R. Francis, Waterbury, Conn., Assignor to The Waterbury, Tool Co., Waterbury, Conn., a Corporation of Conn. The principal object of this invention is to provide means by which the necessity for carrying the large stock of gears is avoided and by means of which the speed ratio of capstan to spider may be accurately controlled and very slight variations or changes in such speed ratio may be made through the entire speed range of the driving gear.

No. 1,775,707, REELING MACHINE FOR CABLES, Patented Sept. 16, 1930, by Charles F. VanHook, Paterson, N. J., Assignor to The Watson Machine Co., Paterson, N. J., a Corporation of N. J. This invention relates to reeling machines for cables, wires and the like, and has for its object to provide means for the reception and discharge of reels without the use of extraneous tackle for hoisting the reel.

No. 1,775,770, MACHINE FOR MAKING WIRE FORMATIONS, Patented Sept. 16, 1930, by Daniel Kondakjian, Newark, N. J. This invention has reference, more particularly, to an automatic machine for making filament support wires for incandescent electric lamps, radio tubes and the like. The inventor provides a new construction and arrangement of bending dies together with means for automatically operating the same in properly timed relation.

No. 1,775,839, ART OF SOLDERING THE LINKS OF WIRE CHAIN MESH, Patented Sept. 16, 1930, by Jonathan Wenz, Georg Brunhubner, and Josef Alvera, Pforzheim, Germany, Assignors to Ernest Gideon Bek, of Pforzheim, Germany. In soldering the chain links, according to this invention, the links are completely inbedded at the first station in a solder material of pasty character, the excess of which on the concatenation leaving the station must be removed. This is accomplished by conducting the chain structure through a perforated or slotted rubber scraper member arranged above the station. The chain is then advanced to a second station containing solder powder and then scrubbed.

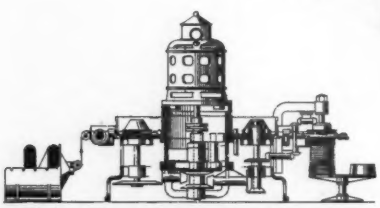
No. 1,775,954, CABLE END AND METHOD OF FORMING THE SAME, Patented Sept. 16, 1930, by Logan Cunningham, South Williamsport, Pa. The inventor provides a terminal for wire cable ends, of a diameter substantially the same as the diameter of the cable, and provides, in addition, a portion with a slot to receive a rope to facilitate threading the wire cable through a sheave.

No. 1,776,220, APPARATUS FOR FABRICATING WIRE MESH, Patented Sept. 16, 1930, by Mahlon P. Gehret, deceased, late of Bridgeport, Pa., by Mary A. Gehret, Executrix, Bridgeport, Pa. This invention is particularly concerned with an apparatus for producing metallic fabric of stout crimped wire useful in the manufacture of protective screens for windows, and the like.

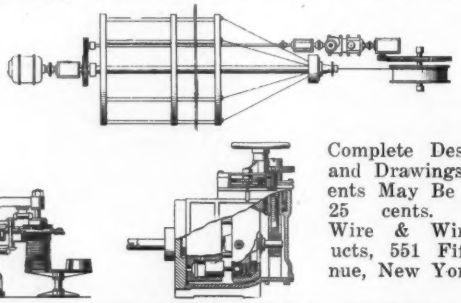
No. 1,776,296, DIE HOLDER FOR WIRE DRAWING BENCHES, Patented Sept. 23, 1930, by Charles Siegfried, Geneva, Switzerland, Assignor to The Firm of Les Freres Breguet, of Geneva, Switzerland. Particularly adapted for very fine wire drawing, this apparatus includes a die-holder having the shape of a tube closed on every side and into which water under pressure is introduced. This tube, preferably, is made in two parts, one part being formed as a cover. This cover may be slid over the freely exposed dies and will partly cover the slits provided for the wires.

No. 1,776,874, WIRE-THREADING MACHINE, Patented Sept. 30. 1930, by Leroy A. Weston and Lawrence O. Weston, Adams, Mass. An object of this invention is to provide a machine for inserting or

(*Please turn to page 446*)

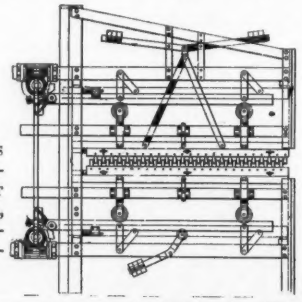


Honig's Wire Drawing Apparatus. 1,772,948.



Francis' Driving Means for Wire Strand-ers. 1,774,880.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 551 Fifth Avenue, New York.



Gehret's Apparatus for Fabricating Wire Mesh. 1,776,220.

Domestic Exports and Imports of Wire and Wire Products

Exports of iron and steel wire and wire products from the United States In July and August, 1930

(In gross tons)

Items	July 1930	August 1930	August 1929	Year through August 1930	Year through August 1929
Wire rods	2,266	3,179	2,969	31,296	31,852
Plain Wire	1,815	1,708	2,983	19,196	32,701
Barbed wire and woven wire fencing	3,552	2,127	4,001	28,311	45,384
Woven wire screen cloth	161	214	148	1,240	1,175
Wire rope	294	306	576	3,320	5,233
Insulated wire and cable	23	21	41	370	691
Other wire and manufactures	640	511	970	5,487	7,987
Wire nails	844	816	733	5,476	9,367
Nails other than wire	402	429	821	3,978	6,465
Tacks	31	30	51	317	1,465
Bolts, nuts, rivets, except track	812	758	1,589	7,604	10,948
Totals, these 11 classifications	10,849	10,099	14,911	106,595	153,268

Imports of iron and steel wire and wire products into the United States

(In gross tons)

Wire rods	485	317	1,369	6,499	11,207
Barbed wire	388	461	727	3,194	4,269
Round iron and steel wire	272	297	322	3,414	4,078
Steel telegraph & telephone wire	5	19	3	43	3
Flat wire and strip steel	52	60	224	852	1,464
Wire rope and strand	179	145	175	1,768	1,686
Hoops and bands	1,734	2,375	7,224	13,427	28,757
Other wire	17	34	19	240	385
Nails, tacks and staples	611	636	993	3,564	6,537
Bolts, nuts, rivets and washers	9	12	62	256	227
Totals, these 10 classifications	4,393	3,715	11,118	33,257	58,613

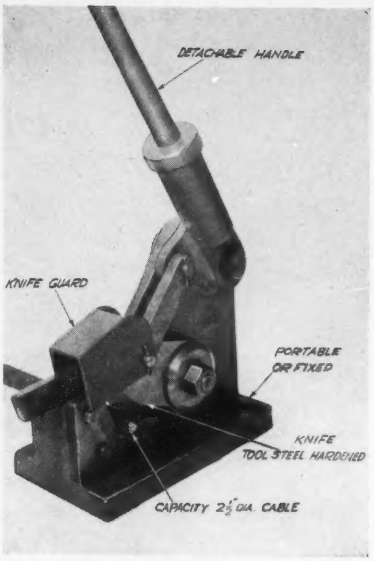
EXPORTS rose in August, the increase being 19,463 tons to give a total of 151,235 tons. This is the first gain since March. Among the wire items which increased were wire rods, woven wire, screen cloth, wire rope and nails other than wire. Outstanding losses were in barbed wire and woven wire fencing, 1,425 tons. The total in the eleven wire classifications stands at 106,595 tons against 153,268 last year, roughly a 50% decrease.

Imports were partly downward and partly up. Barbed wire and round iron and steel wire showed increases as did steel telegraph and telephone wire, flat wire and strip steel, other wire, also nails, tacks and staples. The principal decrease occurred in wire rods, wire rope and strand hoops and bands. The total of these ten classifications shows 33,256 tons against 58,613 tons for last year, a decrease of 40%.

Imports of card clothing totaled 10,968 square feet valued at $17,874—the United Kingdom supplying 9,605 square feet ($15,038) of this total and Germany 1,363 square feet ($2,836). Receipts of wire cloth and screening totaled 38,412 square feet, with 13,726 square feet from Germany, 12,939 square feet from Canada, 6,505 square feet from France and 3,250 square feet from the United Kingdom. Imports of Fourdrinier and other paper-making wires totaled 146,296 square feet, 69,003 square feet coming from Germany, 53,256 square feet from France, and 24,037 square feet from Austria. Receipts of wire fencing and netting totaled 1,994 square feet, with 1,178 square feet coming from Germany, 409 square feet from the Netherlands, and 407 from Belgium.

Wire heddle imports totaled 2,440,000 pieces, of which France supplied 2,140,000 pieces and Germany 200,000 pieces. Wood-screw imports totaled 32,822 gross valued at $3,477—32,782 gross ($3,433) originating in Sweden.

Keystone Steel & Wire Co., Peoria, Ill., reports net profit of $589,909 for the fiscal year ending June 30th.



Common Cause of Short Circuits Eliminated by . . .

NEW CABLE CUTTER

Correct cable-cutting is vital. The customary practice of severing cables by hacksaw is not only inefficient but dangerous. Cross-circuits in high voltage installations are commonly caused by the small copper filings or dust from the sawing operation that trail across the insulation, connecting one wire with another. Here is a machine that checks at its source the peril of cross-circuits,—a modern cable cutter, manufactured by the New England Butt Company, Inc. This machine will cut any cable up to 2½" in diameter with a single stroke. It makes an absolutely clean cut in but a fraction of the time needed under older methods. The knife is safely guarded and made of hardened tool steel. The machine may be portable or set in a fixed position. Write us for prices and full description.

NEW ENGLAND BUTT COMPANY

PROVIDENCE, R. I.

Chicago Office, 140 S. Dearborn St.

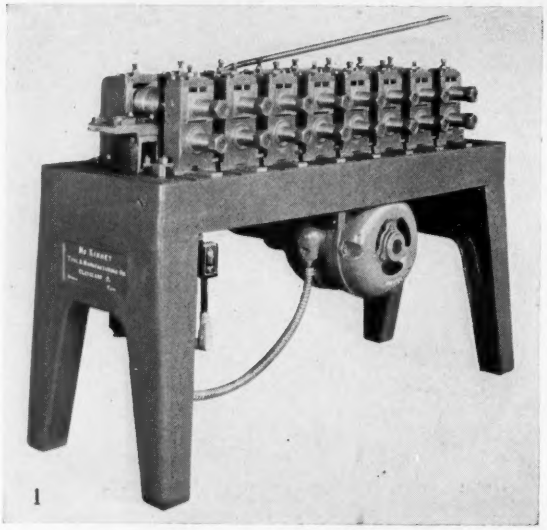
New Wire Machinery and Equipment

Description of Recently Developed New Tools of Interest to the Wire Industry

McKinney Rolling Machines

A new small high grade rolling machine using roller die for forming the metal has been placed on the market by the McKinley Tool & Mfg. Co., Cleveland, O. This as shown in the accompanying illustration has the base of heavy box type casting ribbed for stiffness. Housings are semi-steel castings. Main housings are grooved to the bed and doweled in place, giving virtually a one-piece construction of great strength.

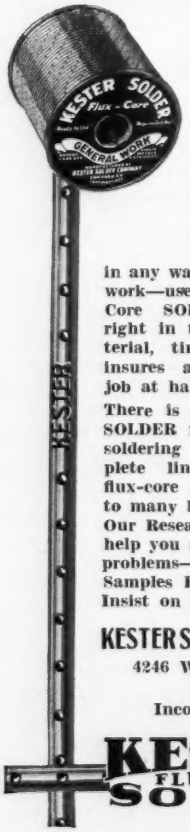
The front housings are not bolted to the bed but slide on a guide strip and may be held by clamp bolts in tee slots. This permits the housing to be placed up against the work roll when a wide or narrow section is being rolled, that is giving support where it is needed most and reducing spindle deflection. It also permits rolling much heavier sections than can be rolled on a machine of this type otherwise. Another exclusive feature of these machines is that they may be used as a standard two housing machine for heavy work and by pushing the front housings back until the ends of the work spindles are exposed, a strong and convenient machine for light work is produced. The best of materials are used throughout and workmanship is of the highest order. They are equipped with all bronze bearings, but Timken roller bearings can be furnished at additional cost. The work spindles are chrome nickel steel hardened and ground.



McKinney Small Rolling Machine Using Roller Dies.

As roll forming of strip and sheet metal is rapidly taking the place of press and press brake forming these machines which produce a better product faster should be decidedly popular.

Other machines made by the McKinney concern include special rolling, beading and forming machinery, rotary slitters, high speed cut-off saws, reels of various types, straighteners and levelers, blanking and forming dies.



CUT OPERATING COSTS

When you find it desirable to cut operating costs—without resorting to a change in wage schedules or in any way sacrificing quality work—use the KESTER Flux-Core SOLDERS. The flux right in the core saves material, time and labor—yet insures a perfect soldering job at half the cost.

There is a specific KESTER SOLDER for every industrial soldering need. The complete line includes 48,000 flux-core solders in addition to many bar and wire forms. Our Research Laboratory will help you solve your soldering problems—without obligation. Samples FREE upon request. Insist on KESTER.

KESTER SOLDER COMPANY
4246 Wrightwood Ave.,
Chicago
Incorporated 1899

KESTER FLUX-CORE SOLDER

WIRE DRAWING DIAMOND DIES
IN NICKEL STEEL SETTINGS

Manufacturers for Over 35 Years
[Originators of the Steel Setting]
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250-252-Ogden Ave.
JERSEY CITY, N. J.

The Waterbury Wire Die Co.

Diamond, Composition and CHILLED IRON DIES
Waterbury, Conn.

HANDY & HARMAN
FOUNDED 1867
QUALITY SERVICE

Quick work
and Strong, Neat Joints
with - - - - -
"HANDY" SILVER SOLDERS

And the cost is apt to be *lower* than with the base-metal welding and brazing compositions.

Because Silver Solders are so much easier to work with that relatively low-priced hands can do the work.

Then, too, the prices of Silver Solders are now much lower than ever before, due to large scale production and the present low price of silver.

For further information send for a copy of our Bulletin No. 3WW.

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AMERICAN
PRESSED STEEL
REELS

PRACTICALLY INDESTRUCTIBLE
STANDARD TYPES 2½ IN. TO 8 FT.
SPECIAL TYPES MADE TO ORDER
WRITE FOR CATALOG

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MISCELLANEOUS STAMPINGS
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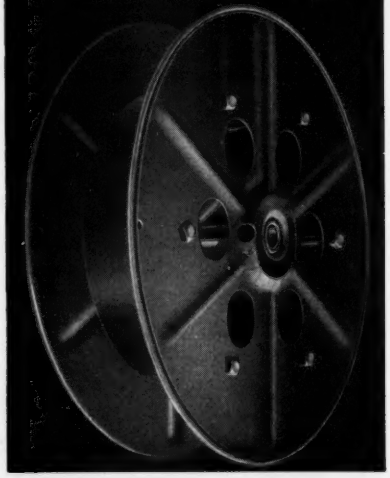


Rustless Chrome Iron Alloys

Rustless iron is now available for drawing into various rod and wire forms, this being a chrome iron alloy with a high percentage of chromium and a very small amount of carbon. Iron is widely known to be resistant to corrosion but it was discovered more than a century ago that an addition of chromium to iron increases the corrosion resistance.

Until recently the production of low carbon chrome alloys was too expensive and difficult to allow their practical use but through the Wild Process a simple reduction process, will produce a high output at a cost of raw material plus the cost of only one furnace operation.

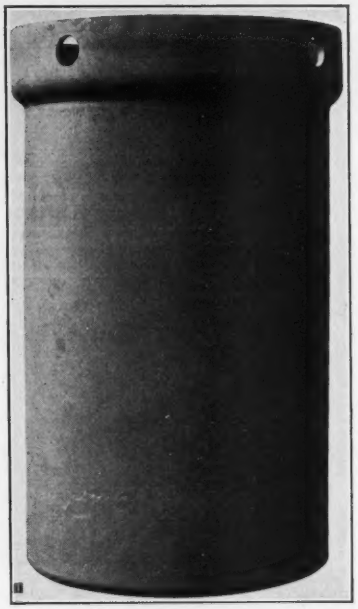
This material is available in hard wire half hard and soft, either cleaned or bright annealed. In strips from ½ inch to 22 inches wide and gauges from .010 to .190, the hot rolled either annealed or pickled, and the cold rolled, annealed and polished and also suitable for buffing. Rounds may be had hot rolled, annealed, pickled, straightened, cold drawn, and centerless ground from ¼ inch to 6 inches in diameter in commercial lengths. Squares, Octagons, Hexagons, hot rolled, annealed, pickled, straightened, cold drawn, in the same sizes. Flats, hot rolled, annealed, pickled, straightened and cold drawn from ⅛ to ⅜ to 3 inches by 7 inches in commercial lengths, suitable sizes for bolts, nuts and rivets, ingots, billets, blooms and bars as desired, and special shapes by arrangement.

Edis Belt Preservative

This is an oil dressing for leather belts. The dressing not only enables the belt to drive more efficiently but preserves the leather. It is a strictly high grade oxidized fatty oil, largely a combination of purest neatsfoot and castor oil, highly refined and thoroughly oxidized. This oil is guaranteed to contain no rosin, asphalt, tar pitch, nor other injurious substances.

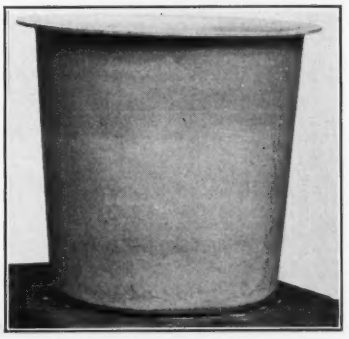
It will penetrate leather readily also canvas, balata,

STANDARD FORGE
FIRE-HAMMER
WELDED
ANNEALING POTS



Furnished in any practical size or shape. With either single or double bell offset at top and with or without lifting holes as shown.

Salt Annealing Pot
(Forge Fire Hammer Welded)



The shell or body of the pot can be furnished either straight or tapered.

Annealing Pots and Pans
Lead Melting Pots
Salt Annealing Pots
Galvanizing Pots and Kettle
For All Requirements

Columbiana Boiler Company
COLUMBIANA, OHIO

When the bids for the new bridge are identical in Price the deciding factor is—

EXPERIENCE

Any manufacturer may make a good Diamond Die—but when you entrust your work to a Premier Diamond Die you are trusting it to Experience. As wire drawers for over 30 years we know your problems—we have worked out these problems for ourselves and Premier Diamond Dies are the Better Dies made for your individual needs.

"PREMIER"
Trade Mark Reg. U. S. Pat. Off.

DRIVER-HARRIS COMPANY
HARRISON, NEW JERSEY
Chicago - Detroit - Morristown,N.J. - England - France
Alloy Makers since 1899

camels' hair and rubber belts. It waterproofs and preserves the fibres in the belt also rubber.

Belts in continuous operation should be dressed at regular intervals, once a week or once in three months according to conditions. This is supplied in containers of the following sizes: one gallon cans holding 8 lbs. up to whole drums which contain 400 lbs. by the makers Research Mfg. Co., Philadelphia.

J. I. Bernitz, importer of wire machinery, New York, has moved its Canadian office to 11 Wellington St., East, Toronto.

Structure of Hard-drawn Wire

(*Continued from page 425*)

wires, measurements were made on the original wires before etching and on the wires after each successive etching.

The potentiometric method was used and direct e.m.f. readings made to 10^{-6} volts. The wires were placed in a special bridge and mercury end contacts were used in order to insure parallel lines of flow (especially for the heavier wires). A definite current, accurately measured, was passed through the wires and the drop in potential between two intermediate knife-edge contacts was measured on the potentiometer. The Leeds & Northup type K potentiometer was used for this purpose. The distance between the knife-edges was accurately adjusted and maintained constant for all observations.

For the original wires the areas of cross-sections were determined after measuring the density by weighing the wires in water and air. The area was then calculated from the volume thus determined and the length of the wire. These areas were checked by measuring the diameters with a micrometer caliper as well as with a micrometer microscope under a magnification of 70 dia. The areas of cross-sections thus determined were found to agree within the necessary limits of accuracy. For the intermediate samples, where there was a likelihood of differential etching along the length of the wires, the micrometer measurements were carefully checked. As an added precaution, after making the last potentiometric measurement, the wire was cut under the knife-edges and the cross-sectional area of the part of the wire actually measured was again determined by all three methods mentioned above and found to agree.

In Table 2 the results of these measurements are tabulated for the wires chosen as being representative. Figure 1 is a graphic representation of these results plotted logarithmically so as to more nearly represent the cumulative nature of the changes in the resistivity observed.

No explanation of these curves seems necessary. As was previously generally accepted, the resistivity in the skin in hard-drawn wires was found to be higher than that in the wires after the first etching. More correctly stated, the average resistivities of the original wires were higher than the average resistivities of the wires after the outer surfaces had been dissolved off. However, for the hard-drawn wires the curves representing these averages resistivities abruptly changed in slope after the first etching, and upon subsequent etchings were found to rise to a maximum value as the longitudinal axes of the wires were approached. For finer wires, where it was thought that the small current flow may have some heating effect, thus increasing the resistivity, the probable rise in temperature occurring in the wire (assuming no radiation) was calculated for the time necessary to make an observation. It was found that the increase in temperature would be negligible for the currents used. To check the specific resistivity in these finer wires various current strengths were used and the drop in potential in the wires was de-

termined for each. The results shown in the curves were obtained by using currents sufficiently low in strength to allow the heating effect manifested to be negligible.

Conclusions

Crystal orientations in hard-drawn copper wire becomes preferred as one penetrates from the skin to the core.

The orientation is one in which the cube edge is parallel to the fiber axis or direction of drawing.

The resistivity measurements indicate that the resistivity increases with the degree of this particular type of preferred orientation.

From this work and that of Harris it also appears that a similar relation exists between the tensile strength and the degree of preferred orientation.

Crystal orientation in annealed copper wire is not preferred.

The average specific resistivities from the skin to the core in annealed copper wires did not vary. In the event that the resistivity varies with the degree of preferred orientation, this is as would be expected.

The nature of the material at the core of the hard-drawn wire, owing to its preferential orientation, approaches that of a single crystal. Hence, evidence seems to refute the theory of higher conductivity in single crystals.

Hard Metal Diamond Substitutes

(*Continued from page 430*)

to avoid blank soft or half drawn iron wire. It is advisable before drawing to provide iron and steel wires with a copper coating by dipping in a copper vitriol solution, to brass-plate bronze wire, and with copper wire it must be seen that it is freed from all acid residues from the pickle. The grading of the draws should not be too small as a too slight draw attacks the cone more quickly than a stronger draw. Soft iron-, brass-, copper- and aluminum-wires should preferably

DIAMOND

KOEBEL WAGNER

DIES

FOR:

LONG WEAR—SMOOTHNESS—
ACCURACY IN WIRE DRAWING

Koebel-Wagner diamond dies are selected from finest quality large diamonds to provide extra heavy walls.
All Koebel-Wagner diamond dies are designed with shapes to give the least resistance and maximum production on all kinds of wire.
Our diamonds are securely set in cast steel and cased in brass giving a firm setting that will outlast the die itself.
Koebel-Wagner diamond dies will draw any metal that is suitable to diamond die drawing and do it with economy, speed, and uninterrupted production.

Consult us on your diamond die problems.

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THE MOST RELIABLE

DIAMOND DIES

ON THE MARKET TODAY
USE OUR DIES
FOR SAFE and SUSTAINED PRODUCTION

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Manufacturers of

WIRE DRAWING DIAMOND DIES

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WIRE DRAWING Machinery and Equipment

Rod Frames—16" Frames
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General Castings for Wire Mill Use
Circulars on Request.

E. J. SCUDDER FOUNDRY & MACHINE CO. TRENTON N. J.

The only concern SPECIALIZING in the manufacture of

Wire Drawing Soaps

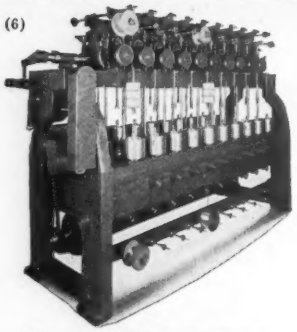
SINCE 1892

THE J. T. ROBERTSON CO., INC.

SYRACUSE, N. Y.

Ask about our special soaps for use with the new alloy dies.

(6)



Model 1S-20 BB Single Cover, Cotton or Silk Insulation Machine.

High-Speed Ball-Bearing Spindles, Flyers are dynamically balanced, operating at 6000 R. P. M.

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STEELSKIN

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For High or Low Carbon Wire

WIRE DRAWING SOAPS

Established 22 years.

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The newest edition of the National Metals Handbook contains among much other valuable material, these new subjects:

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Cyaniding
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This is the former A. S. S. T. Handbook, revised, enlarged, improved in many many. Nearly 1,000 pages, flexible covers, pocket size. To non-members, A. S. S. T., $10.00 postpaid.

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WIRE & WIRE PRODUCTS

551 Fifth Avenue New York, N. Y.

be graded at 12%, hard wires of steel, bronze, hard copper and hard brass at 10% and hard wires of tungsten, mol-bdenum and chromenickel steel at 7½%.

Special Lubrication Needed

The first draws after the annealing can generally speaking be about 2% heavier. Special attention should be given to the good lubrication of the die. With iron and steel wires a lubricating grease and perhaps also sulphuric acid should be added to the drawing liquid. If the wire runs heavily more grease than usual is added to the drawing liquid. If the wire binds more sulphuric acid must be added. The dies should rest in the drawing liquid as far as possible If this is not possible special care must be taken to obtain good lubrication and cooling as otherwise the polish of the drawing channel will be damaged and the die becomes useless. The wire must run accurately through the draw hole.

Precautions Drawing Copper Wire

When drawing copper wire only suitable copper grease is added to the drawing liquid but no acid, as copper when drawing runs free from acid. It is advisable to wipe out the drawing channel from time to time as otherwise the wire, owing to the metal chips which adhere in the cone, will easily bind. The die should also not be left in the draw until it gets rough but should be repeatedly polished with a piece of wood. Thereby its life will be increased. When the drawing cone is worn it can be polished like a diamond drawing die and brought to a larger diameter, when the die is again fitted for use. It is advisable to add a large quantity of Paris red with the fine grain of the diamond powder as then a particularly high polished surface will be obtained. The polishing of the hard metal dies is preferably carried out on a needle polishing machine.

British Insulated a Great Co.

(*Continued from page 423*)

entire length of the shop on each side, leaving a clear floor for handling heavy drums and finishing braided aerial cables.

In addition to the cotton-covered winding wires, large quantities of solid and stranded conductors for overhead use are braided with jute or cotton, the braiding being impregnated with compounds of various kinds for weatherproofing or heat resisting purposes. The department is also equipped with modern winding machinery for preparing the cotton yarns for cotton covering, enabling the required number of ends to be made up for any covering.

Prescot has been turning out enamelled wire for more than a quarter of a century, and a present month's output is over twice the earth's circumference. Enameled wires are much used for fine windings where the space factor is important, as in telephone and wireless apparatus, small motor field coils, magnet coils, etc., and has the further advantages that it is non-hygroscopic and will withstand considerably higher working temperatures than cotton or silk-covered wire. In the enamelling shop is installed a large number of modern machines electrically heated and capable of close speed and temperature regulation, an essential in enamelling, where time and temperature are important factors. The principle of enamelling consists in passing the clean bare wire through a bath of enamel, then through a heated tube or casing, over a pulley, and through the enamel bath again, each coating of enamel being thus individually stoved, the number of repetitions being arranged to give the required thickness of covering. The wire is subsequently rewound on reels, being examined during re-winding, after which it is ready for despatch.

All Drums and Reels Built

Not far from the test room is a large building where drums of all sizes are built, from little

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The Quality Diamond Dies

1870

1930

Our sixty years experience,
The quality of our stones,
Our special steel setting,
The output of our French Plants,
The large stock we are carrying,
Enable us to take care of the most particular requirements.

Balloffet Diamond Wire Dies Co., Inc.

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PLANTS AT

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We keep for immediate delivery enormous stocks at low prices

ANNOUNCEMENT

VIANNEY

Famous Wire Drawing Diamond Dies

November 1st, 1930

To keep in line with the tendency of the present times:

1—We are reducing once more the prices of our diamond dies.

2—At the same time, our inspections are more exacting than ever before.

3—Once more, on arrival here, all dies are re-inspected and tested for quality, general workmanship and absolute exactness.

4—To maintain this efficiency our N. Y. plant is being thoroughly reorganized.

Write for our new prices

VIANNEY

100 FIFTH AVE., NEW YORK

THE LARGEST DIAMOND DIES PRODUCER IN THE WORLD TODAY

Metal Spools for Wire Drawing

Metal Spools for Annealing

Metal Bound Spools for Shipping

Metal Bound Reels for Shipping

Hubbard Spool Co.

1620-32 Carroll Avenue

Chicago

reels for house wire to 9 ft. drums for large super tension cables. Here every advantage is taken of modern wood-working machinery and there is a fine equipment of saws of various sizes and types, boring and molding machines, etc. The timber for drum building comes in by rail, and from the siding is slid down by an inclined roller way to the timber yard, from which it passes directly to the drum shop to be sawn into planks, cut to length, nail-together to form drum sides and trimmed to a circle ready for building into the complete drum. Something like 20,000 drums a year are turned out; for it must be remembered that in the case of a large export business like that of the B. I. a very large number of drums are sent overseas and are not returnable, while a large stock has to be maintained for the home market. The scrap ends of planks are not wasted, for a firewood cutting plant has been added to this department, turning out over 1,000,000 bundles of wood a year for sale. Recently a creosoting plant has been installed for treating timber up to 22 ft. in length by the latest process and the company supplies creosoted timber or will undertake treatment of customer's own timber if desired.

No cable factory worthy of the name can exist without departments for the manufacture of the various boxes, feeder pillars, cutouts, and other accessories for use with cables, and Prescot is no exception; in fact the B. I. claim that they were the first cable makers to produce a complete range of boxes for all types of cable.

Iron and brass foundries, a large machine shop, three assembly shops, and a busy drawing office are all engaged in the production of cable accessories.

Electric welders, rivet heaters, and ceiling fans, both for their own use and also for sale are accessories made by the British Insulated, while meters and paper pinions are other productive sources of revenue.

These are examples of how great a number of little adjuncts to a business can be turned to advantage outside although originally produced for home consumption. All these productions dovetail in to the business of British Insulated.

Miss H. M. Addor, for the past 13 years Secretary, Vianney Wire Die Works, has resigned and will establish the Addor Wire Die Works at 104 Fifth Ave., New York, N. Y. This company is equipped to furnish diamond dies for all kinds of wire, also alloy dies, and will handle the dies produced by the Dodat Wire Die Co., Trevoux, France. They are equipped to do regrinding, repolishing and die repair work also.

Statement of ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of Wire & Wire Products published monthly at Washington, N. J., for October 1, 1930.

State of New York, County of New York, ss.: Before me, a Notary Public in and for the State and county aforesaid, personally appeared Richard E. Brown, who, having been duly sworn according to law, deposes and says that he is the Publisher of Wire & Wire Products and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Quinn-Brown Publishing Corporation, 551 Fifth Avenue, N. Y. City; editor, Morris A. Hall, 551 Fifth Avenue, N. Y. City; managing editor, none; business manager, Richard E. Brown, 551 Fifth Avenue, N. Y. City.

2. That the owner is: Quinn-Brown Publishing Corporation, 551 Fifth Avenue, New York City. Leta B. Brown, 551 Fifth Avenue, New York City; George I. Baker, Hammonton, N. J.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person ,association, or corporation has interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

RICHARD E. BROWN,
(Signature of Publisher)

Sworn to and subscribed before me this 10th day of October, 1930.

(SEAL) L. D. SCHWAERER,
Notary Public.

My commission expires March 30, 1932.

HUDSON WIRE CO.

Successors Royle & Akin

Fine Wire Manufacturers

OSSINING Established 1902 NEW YORK

Manufacturers of Fine Bare Wires

Copper Wire Specially Processed for Enameling Purposes

Copper	Lead
High Brass	Zinc
Low Brass	Commercial Bronze
Pure Tin	Phosphor Bronze
Cadmium	Silver Plated Copper
Bronze, Various Grades	False Gold

10%, 18%, 30% Nickel Silver

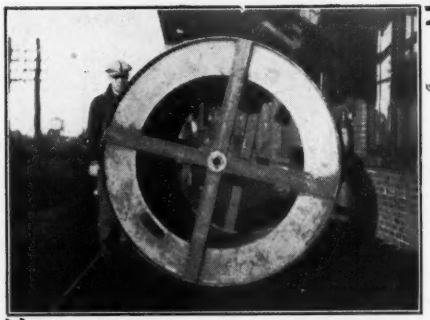
LAHN

False Gold Copper Silver Plated Copper

BRUSH WIRES CRIMP and STRAIGHT

Brass Copper
Steel Nickel Silver
Phosphor Bronze

Metallic Fibre for packing purposes



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How can "Big Boys" weigh so little and work so much? Pressed steel and scientific design are the answers. These Apco Mossberg Reels make handling easier and freight bills lower. And their long range wearing qualities put any worry about replacement cost way out of sight.

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GLOBE DIAMOND DIES

for Wire Drawing

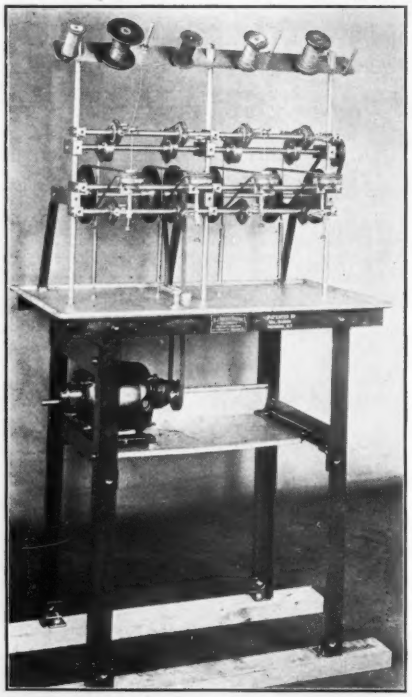
We have concentrated on the following four outstanding points, required to make a perfect die, with the following results:
1. We use utmost care in the selection of HIGHEST QUALITY GLOBULAR DIAMONDS.
2. Our PATENTED REINFORCED STEEL SETTING has been further improved, and now the diamond is at no time exposed to a greater heat, than is required for brazing with silver solder.
3. Shaping of the hole is done by a new process which gives absolute results as to any shape desired, and assures smooth and easy drawing.
4. Roundness of hole and accuracy in sizes are not problems any more, as perfect results in that respect are easily accomplished with a perfectly shaped die.

Our representative will gladly call on request.

GLOBE WIRE DIE CORP.

30 Park Place New York, N. Y.
TELEPHONE: WORTH 1986
Branches: Detroit, Chicago, Cleveland, Buffalo
European Offices: Antwerp, Amsterdam, London, Paris

The Haddow Die Re-Cutting and Polishing Machine will lower your die re-cutting cost to a fraction of present costs



Recuts dies about ten times faster than by the needle and dust methods and with less diamond dust.

Any unskilled operator can learn to handle it quickly and efficiently.

ONE MONTH'S SHOP PRODUCTION

Total number of dies cut —1047

Total number of hours required—182.5

Average number of dies per hour—5.73

Number of operators—1

With only one man—This machine will do the work now requiring four to six men in less time and at lower cost.

4 HEAD MACHINE—Also Made in 6-Head size (With 2 Heads for Heavier Dies).

Fully Protected by Patents
For Information About Shop Rights

WILLIAM HADDOW
17 Eastern Ave.
Ossining, N. Y.

Needle and Pin Output Worth $23,000,000

According to data collected in the Census of Manufactures taken in 1930, the value of products delivered in 1929 by establishments engaged primarily in the manufacture of needles, pins, hooks and eyes, and snap fasteners amounted to $22,991,878, an increase of 13.1% over 1927. The largest single item making up this total was snap fasteners and clasps $6,328,581.

In addition needles, pins, hooks and eyes and snap fasteners are manufactured as secondary products by establishments in other lines. The value of such commodities in 1927 was $2,152,441. The corresponding value for 1929 is not now available.

American Enameled Wire Co., Port Huron, Mich., is completing removal of plant from Muskegon to new building at Port Huron, where production will be concentrated and facilities provided for increased output. Company is a subsidiary of Electric Auto-Lite Co., Champlain and Mulberry Streets, Toledo, Ohio.

W. S. Tyler Company, Cleveland, Ohio,, manufacturer of wire cloth, screens, etc., has plans for a three-story and basement addition, 70x105 ft., to cost over $125,000 with equipment.

General Cable Corp., has announced a plan of unification, effective Oct. 1, which will affect industrial plants of the organization in thirteen cities in this country.

Four divisions under which the plants have been functioning since the formation of the corporation three years ago lose their identities entirely and hereafter will come under the general name of the corporation.

The announcement also said the corporation's treasurer's and comptroller's departments will be transferred from New York to this city.

Heat Control in Insulating

(*Continued from page 421*)

small rise in temperature of the lead in the pot will cause this mercury to expand, exerting a considerable force on the lever system of the control; throttling the bleed air to the bottom of the duplex valve, thereby causing it to close, extinguishes the burner.

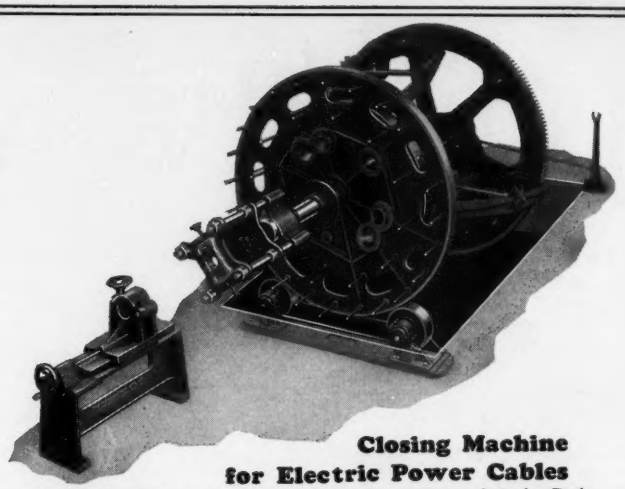
At a slight lowering of the temperature of the molten lead, the mercury in the element contracts, reversing the operation described above, and the main burners are brought on to check any further drop in temperature. The blower runs continuously.

Improved Control Methods

An improvement on this control system is utilized in the plant of the Okonite Co., in Passaic, N. J., and in that of John A. Roebling's Sons Co., Trenton, N. J. Here by means of a different type of Partlow control, not only is the air and gas turned on and off with changes in metal pot temperature, but the blower is controlled as well. The same type of flexible mercury tube element is employed as before, but instead of operating an air valve, it actuates an electrical contactor, thereby interrupting the electric current supply to the motor blower through a satisfactory relay switch. This ingenious device makes the entire burner and blower equipment absolutely automatic from start to finish of the day's work. The operators need not watch or adjust the burners throughout their operation. The day's work is started and stopped by the snap of an electric switch.

It is interesting to note that during the past six months in some of the outstanding cable companies, gas has replaced oil as a fuel due to its greater flexibility and ease of control.

Although automatic temperature control of metal here need not be as close as required in the newspaper industry, it is, nevertheless, absolutely essen-



Closing Machine for Electric Power Cables

THIS machine receives two, three or four reels, as desired. Reels 48" Dia. x 36" over all width, held in position inclined to hollow main spindle, minimizing bending of conductors.

Planetary or rigid frame operation as desired, spindles provided for filler cops.

Twisting plate, closing die, capstan and receive reel take up are included.

Machinery for the manufacture of rod, wire and cable — Special Machinery.

The Torrington Mfg. Co.
Torrington - Conn, U.S.A.
44 Franklin St.

NEW YORK'S NEWEST

NEW! MODERN! LUXURIOUS!

1000 Rooms—1000 Baths

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RADIO IN EVERY ROOM

$3 DAILY

SINGLE	$3.00	$3.50	$4
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ROY MOULTON, *Manager* Telephone Circle 8500

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VICTORIA

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URDIKA

ELMARID

The most improved metal composition die.

Manufactured in sizes ranging from .010" to .250"

STEEL SET

DIAMOND DIES

Highest Quality

Accurate Size Smooth Draw

URDIKA

WIRE DIE WORKS, INC.

129 Fulton Street New York City

tial as it unquestionably effects a saving in fuel consumption. Overheating or burning of the metal is impossible, the temperature of the lead poured is uniform, and metal dross is reduced to a minimum. The formation of dangerous red lead oxide, so devastating as the cause of premature electrostatic breakdown of the cable, is unknown because of the uniformly correct temperature of the lead. And the elimination of the human element, in attendance at the burners, renders the use of automatic gas burners and temperature control equipment absolutely imperative in order to insure the uniformity of product required by the utility companies for which the cable is destined.

Combat Wire of Signal Corps

(*Continued from page 419*)

factors? Has it overlooked recent production improvements? Must old methods be retained or can an alloy be used that is capable of being both stranded or bunched into a conductor giving a breaking strength of 300 pounds. Can this in turn be insulated by perhaps a double coating of rubber so as to eliminate braiding and result in a conductor having a resistance of about 90 ohms and weighing 65 pounds per conductor mile?

Circular Proposal NY-31-38 will be opened by the Signal Supply Officer, N. Y. General Depot, Army Base, South Brooklyn, N. Y., at 1:00 p. m. Eastern Standard time, Nov. 7 1930 for Signal Corps Wire, type W-110 per specification 71-478, bids f.o.b. factory in lots from:

4,000 to 4,999 miles;
5,000 to 5,999 miles;
6,000 to 6,999 miles;
7,000 to 7,999 miles;
8,000 to 8,999 miles;
9,000 to 10,000 miles.

Copies of this Circular Proposal may be obtained from the Signal Supply Officer, New York General Depot, Army Base, South Brooklyn, N. Y.

BUYERS' GUIDE

For more complete information, consult the annual Directory, Index & Buyers' Guide.

ANNEALING POTS
Columbiana Boiler Co., Columbiana, O.

ANNEALING SALTS
European Color & Chemical Co., Weehawken, N. J.

ARMORING EQUIPMENT
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

BRAIDER CARRIERS
Mossberg Pressed Steel Co., Attleboro, Mass.

CASTINGS—Wire Mill
E. J. Scudder Foundry & Machine Co., Trenton, N. J.

CRANES—Wire Mill
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Chilled Iron
Waterbury Wire Die Co., Waterbury, Ct.

DIES—Diamond
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Bellet Diamond Die Works, N. Y.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Globe Diamond Die Corp., New York.
Koebel Wagner Diamond Corp., New York, N. Y.
F. Krause & Co., Inc., Jersey City, N. J.
Master Wire Die Corp., New York, N. Y.
Union Wire Die Corp., New York, N. Y.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Works, New York.
Waterbury Wire Die Co., Waterbury, Ct.

DIES—Composition
Urdika Wire Die Works, Inc., New York

DIES—Repairs & Re-Cutting
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Bellet Diamond Die Works, N. Y.
Cochaud Wire Die Corp., New York.
F. Krause & Co., Inc., Jersey City, N. J.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Wks., N. Y.

DIES—Recutting and Repolishing Machine
Wm. Taddow, Ossining, N. Y.

DIES—Tungsten Carbide
Carboloy Co. Inc., New York, N. Y.
Master Wire Die Corp., New York, N. Y.
Union Wire Die Corp., New York, N. Y.

FLUXES—Soldering
Kester Solder Co., Chicago, Ill.

Steel and Its Heat Treatment

by D. K. Bullens
(Consulting Metallurgist)

29 Chapters of useful information, divided into 3 Sections—1. Metallurgical, dealing with the general underlying principles and practice of heat-treatment processes. 8 interesting Chapters. 2. Engineering, pointing out the peculiar qualities of various alloy steels. 13 Chapters packed with data. 3. Production, relating to industrial heating as applied to heat-treating processes. 8 Chapters.

Every Steel Wire Man Should Have A Copy—Price $5.00

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The most comprehensive and authoritative digest of Mechanical Engineering in compact form, the Thoroughly Revised and greatly enlarged New Third Edition of

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EDITOR-IN-CHIEF, LIONEL S. MARKS, *Professor of Mechanical Engineering, Harvard*

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W. B. Chapman, Consulting Engineer,
Ozni P. Hood, Mechanical Engineer and Chief, Technologic Branch, U. S. Bureau of Mines.
Lionel S. Marks, M. E.
M. H. Mawhinney, Combustion Engineer, Electric Furnace Co.
Horace C. Porter, Consulting Chemist and Fuel Engineer.
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WIRE & WIRE PRODUCTS BOOK DEPARTMENT

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Professional Directory

Listing in the Professional Directory is recommended to all engineers, engineering and construction firms and consultants seeking business with wire mills or plants utilizing wire in any form.

W. H. Spowers, Jr.
Consulting Engineer
551 Fifth Ave., N. Y. C.
Specializing in Galvanizing Plants Designed and Installed
Practical Engineering Advice
Vanderbilt 7395

ANNEALING SALT BATHS
FOR
Steel and Copper Wire
Inquiries Solicited
European Color & Chemical Co., Inc.
WEEHAWKEN, NEW JERSEY

Broden Construction Co.
Wire Mill and Cold Rolling Equipment
10255 Harvard Ave.
CLEVELAND, OHIO

THE WALLACE G. IMHOFF COMPANY
HOT GALVANIZING
Plants Installed Consulting Service
VINELAND, NEW JERSEY

Wire mill machinery designer, graduate Technical Engineer, successfully designed machines for drawing fine wire, in copper, brass, lead, zinc, silver and tinsel. Address R. E. Brown, Sec'y., The Wire Ass'n., 551 Fifth Ave., New York.

High-class wire mill man, with long and diversified experience. Engineer, building equipment, plant layout, efficiency methods. Practical, seasoned executive. Now located in Middle West. Address R. E. Brown, Sec'y. The Wire Ass'n., 557 Fifth Ave., New York.

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PATENTS
TRADE-MARKS
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Without charge or obligation, we will inform you on any questions you may put to us touching on patent, trade-mark and copyright law. You may ask: "Should I protect myself by patent, or register under the trade-mark or copyright laws? What kind of a patent should I obtain?" and many other questions that may occur to you. These are vital points to consider and questions will be cheerfully answered.

Evidence of Conception

Before disclosing your invention to anyone send for blank form "EVIDENCE OF CONCEPTION" to be signed and witnessed. As registered patent attorneys we represent hundreds of inventors all over the United States and Canada in the advancement of inventions. The form "Evidence of Conception," sample, instructions relating to obtaining of patents and schedule of fees sent upon request.

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Registered Patent Attorneys
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WASHINGTON, D. C.
Originators of forms, "Evidence of Conception."

Winsted Insulated Wire Co., Winsted, Conn., has increased its capitalization from $100,000 to $200,000 and has purchased the local factory formerly occupied by Empire Knife Co. The company plans a new manufacturing unit and wire-drawing machinery.

—

Driver-Harris Co., Harrison, N. J., has contracted with Krupp-Nirosta group by which they become licensees under the "stainless" steel patents. This group includes Central Alloy Steel Co., Ludlum Steel Co., Crucible Steel Co. of America, Firth-Sterling Steel Co. and Driver-Harris Co. Latter company expects to use these alloys for wire drawings and probably strip. Company also has applied for patents on a process for remelting stainless steel scrap. It is considering a call for bids for one and two-story addition, to cost over $200,000 with equipment. J. A. Finegan, 776 Broad St., Newark, is architect and engineer.

—

Anaconda Wire & Cable Co., 25 Broadway, New York, a subsidiary of Anaconda Copper Mining Co., same address, has purchased plant and business of Weill-Barnfield Corp., Providence, R. I., manufacturer of kindred products. Lacquer process department of acquired plant will be removed to a new building and capacity increased.

Review of Recent Patents

(*Continued from page 432*)

threading wire into a blank having struck-up portions, as for instance a blank of sheet metal which is used for forming a pipe joint, like a sewer pipe.

No. 1,777,117, WIRE ROPE AND METHOD OF MAKING THE SAME, Patented Sept. 30, 1930, by Richard Duane Green, Trenton, N. J., Assignor to John A. Roebling's Sons Co., of Trenton, N. J., a Corporation of N. J. The method comprises forming the wires into helices and laying into strands, forming the strands into helices and laying into rope for a portion of the rope, and then laying the wires into strands and the strands into rope throughout the next portion of the rope without forming the wires and strands into helices before laying.

BUYERS' GUIDE, Continued

GALVANIZING ENGINEER
W. H. Spowers, Jr., New York, N. Y.

GALVANIZING—Hot
Wallace G. Imhoff Co., Vineland, N. J.

GALVANIZING—Inhibitor
Debevoise-Anderson Co., New York

GAUGES—For Electric Cabling, Insulating Machines
The Comtor Co., Waltham, Mass.

GALVANIZING LADLES, PANS, POTS
Columbiana Boiler Co., Columbiana, O.

GAUGES—For Fine Wire
Federal Products Co., Providence, R. I.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

LIME—Pulverized
Amer. Lime & Stone Co., Bellefonte, Pa.

LUBRICANTS—Wire Drawing
R. H. Miller & Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

MACHINE—Die Re-cutting and Polishing
Wm. Haddow, Ossining, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Mossberg Pressed Steel Corp., Attleboro, Mass.

MACHINERY—Bundling
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
New England Butt Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling
Broden Const. Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cutting
American Insulating Mach'y Co., Phila., Pa.
Eisler Electric Corp., Newark, N. J.
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Flat Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanized Wire
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire Enameling
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Measuring Wire
The Comtor Co., Waltham, Mass.
Federal Products Co., Providence, R. I.
New England Butt. Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

MACHINERY—Nail
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

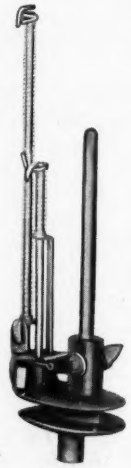
MACHINERY—Pointing
Morgan Construction Co., Worcester, Mass.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rivet
The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

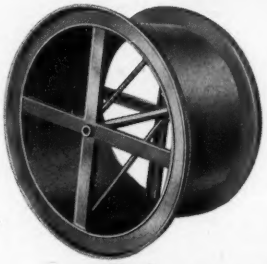
Take Up the Slack

in Production Methods—

Cut Your Production Costs

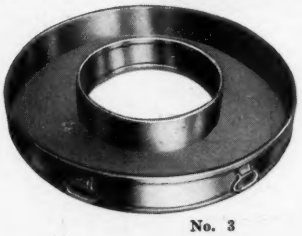


No. 1



No. 2

A REASONABLE investment in strictly modern equipment may mean the difference between black figures and red on your balance sheet. Mossberg Pressed Steel Reels and Spools and other equipment for wire mills are making it possible for many mills to operate more efficiently . . . to cut production costs . . . and to make a profit in the face of strong competition. Our engineering department would like the opportunity of cooperating with you in the solution of your manufacturing problems.



No. 3

No. 1 Mosspeed Braider Carrier which will increase braiding speed up to 80%.
No. 2 Pressed steel Vulcanizing Reel, arc welded. Maximum strength with minimum weight.
No. 3 Pressed steel Vulcanizing Pan, arc welded. Will not spring. Retains shape under severest tests.

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Attleboro, Massachusetts, U. S. A.
Greenville, S. C. Dallas, Texas
Selson Engineering Co., Ltd., London, Eng.

BUYERS' GUIDE, Continued

MACHINERY—Rod
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rubber Strip Covering
New England Butt Co., Providence, R. I.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Torrington Mfg. Co., Torrington, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Eisler Electric Corp., Newark, N. J.
Hallden Machine Co., Thomaston, Conn.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
American Insulating Mach'y Co., Phila Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Sleeper & Hartley, Worcester, Mass.
Waterbury-Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Tube
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Welding
Eisler Electric Corp., Newark, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Manufacturing Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Watson Machine Company, Paterson, N. J.

PACKING—Metallic Fibre
Hudson Wire Co., Ossining, N. Y.

PATENTS
Lancaster, Allwine & Rommel, Washington, D. C.

POINTERS—Wire
Sleeper & Hartley, Inc., Worcester, Mass.

POTS
Columbiana Boiler Co., Columbiana, O.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

REEL AND TENSION STAND—
Sleeper & Hartley Inc., Worcester, Mass.

REELS
American Pulley Co., Philadelphia, Pa.
Apco-Mossberg Co., Attleboro, Mass.
R. B. Hayward Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

REEL CRUTCHES
Watson Machine Co., Paterson, N. J.

SOAPS—Wire Drawing
R. H. Miller Co., Homer, N. Y.
J. T. Robertson Co., Syracuse, N. Y.

SOLDER
Kester Solder Co., Chicago, Ill.

SOLDER—Silver
Handy & Harman, N. Y.

SPOOLS—Wire & Cable
American Pulley Co., Philadelphia, Pa.
Apco-Mossberg Co., Attleboro, Mass.
R. B. Hayward Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

VULCANIZERS
Watson Machine Co., Paterson, N. J.

WIRE—Various Kinds
Hudson Wire Co., Ossining, N. Y.

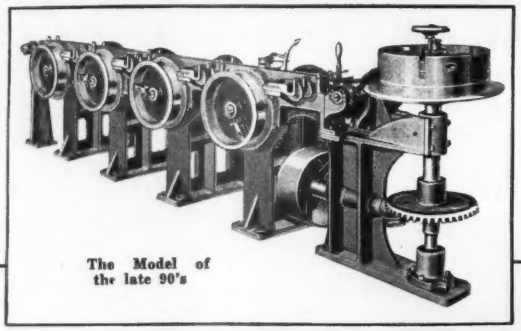
This is a carefully classified index of concerns who specialize in this industry and who advertise regularly in WIRE & WIRE PRODUCTS. Please mention WIRE when writing to these firms.

WATERBURY-FARREL TANDEMS

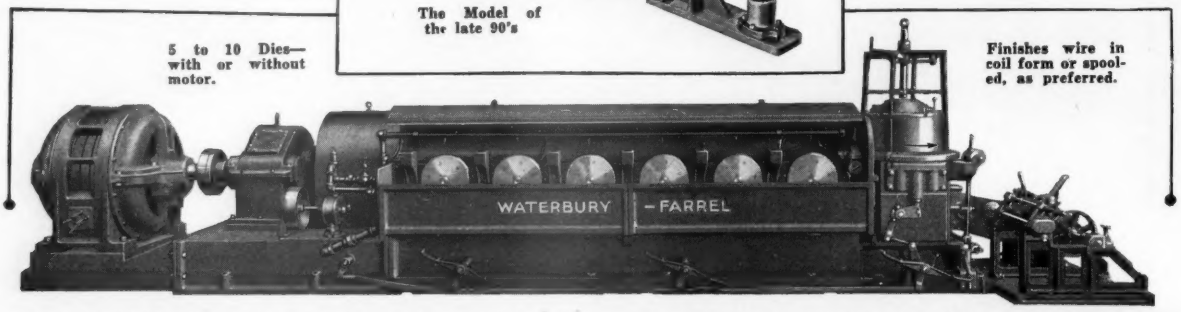
Three Decades Perfecting Continuous Wire Drawing Machines

We thought the old machines were pretty good in the old days (and they were) but times have changed. Today we offer not a better method nor a new principle, but—a far better machine that meets in eloquent fashion every demand of the present day—

High Speed
Low Operating Cost
Mechanical Efficiency



The Model of the late 90's



No. 1 Machine. Forced feed lubrication. Ball Bearings throughout. Starting size, 5/16" copper rod.

The Waterbury Farrel Foundry and Machine Company

Home Office and Works: Cottage Place, Waterbury, Connecticut Western Sales Office: Cleveland, Ohio

THE WATSON MACHINE COMPANY

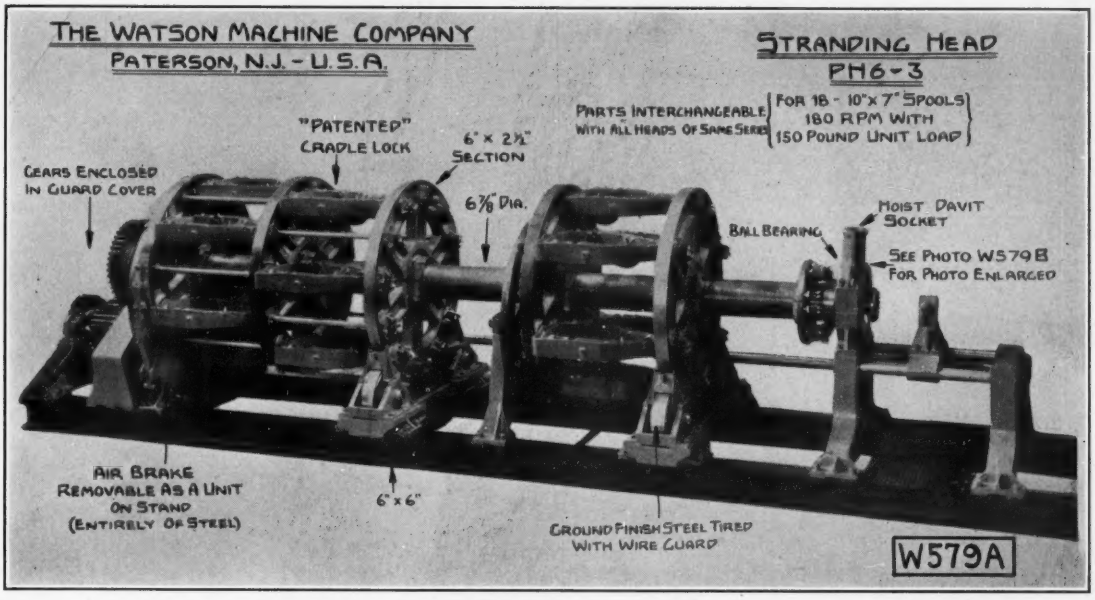
ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

ENGINEERS - FOUNDERS - MACHINISTS

Planetary Horizontal Stranding Heads

Heads for 6, 12, 18, 24, 30 and 36 Spools in each series.


THE WATSON MACHINE COMPANY
PATERSON, N.J. - U.S.A.
STRANDING HEAD
PH6-3
PARTS INTERCHANGEABLE WITH ALL HEADS OF SAME SERIES
FOR 18 - 10"x 7" SPOOLS
180 R.P.M. WITH
150 POUND UNIT LOAD
"PATENTED" CRADLE LOCK
6" x 2½" SECTION
GEARS ENCLOSED IN GUARD COVER
6⅜" DIA.
BALL BEARING
HOIST DAVIT SOCKET
SEE PHOTO W579B FOR PHOTO ENLARGED
AIR BRAKE REMOVABLE AS A UNIT ON STAND (ENTIRELY OF STEEL)
6"x6"
GROUND FINISH STEEL TIRED WITH WIRE GUARD
W579A

In 50, 100, 250 and 500 pound sizes (series PH5, 6, 7 & 9). All anti-friction bearing with positive elimination of spool side-slap, with air brakes, automatic stops, low lead angles and rotors allowing highest operating speeds with ample safety. Latches prevent throwing of spools in operation. Send for bulletin and photos. With Lang Lay Attachment if desired.

ELECTRICAL WIRE AND CABLE
WIRE ROPE and CORDAGE MACHINERY

Morgan-Conner Wire Machines

Continuous processes lead to continuous profits.

MORGAN CONSTRUCTION COMPANY

Worcester, Mass., U. S. A.

Sole licensee for Morgan-Conner Wire Machines in Europe

MALMEDIE & COMPANY

Maschinenfabrik Aktiengesellschaft **Dusseldorf, Germany**

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ENGINEERS AND MANUFACTURERS